NATURE MAGAZINE

ecember, 1944 35 Cents Vol. 37, No. 10

SEVENTY-TWO AMERICAN BIRD SONGS

ON PHONOGRAPH RECORDS

American Bird Songs

These Phonograph Bird Song Records are from the Laboratory of Ornithology, Cornell University. They were recorded in Native Wilds by the Albert R. Brand Bird Song Foundation.

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THE PROCESS OF RECORDING

These recordings were all made in the birds' natural haunts. The scientists used a sensitive microphone at the focal point of a three-foot parabolic sound-reflector which was aimed, like a gun, at the singing bird. The sound waves thus intercepted were transformed by the microphone into electrical impulses, much amplified in a sound-truck, and then used to vibrate a delicate galvanometer on which was fastened a tiny mirror. A slender beam of light shining on this vibrating mirror was deflected to a 16-millimeter film which passed from one magazine to another at a constant rate of speed. Thus the bird's song was photographed so that the image or sound-track developed on the film could be used in a reverse process and made to reproduce the song, which was then, in the laboratory, recorded on a phonograph disk.

The bird's song had to be amplified several thousand times. That means that extraneous sounds, such as wind in trees, running water, airplanes, farm machinery, and notes of other birds were amplified too. For that reason many promising attempts at recording proved failures. The songs here recorded represent the best results of many efforts.

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Each Song Introduced and Identified

Birds of the Northwoods

No. 1 A	*No. 1 B*
1. Olivebacked Thrush	1. Scarlet Tanager
2. Veery	2. Rose-breasted Grosbeak
3. Wood Thrush	3. Slate-colored Junco
4. Hermit Thrush	4. Yellow-bellied Sapsucker
5. White-throated Sparrow	5. Alder Flycatcher
6. Whip-poor-will	6. Olive-sided Flycatcher

Birds of Fields and Prairies

No. 4 A	*No. 4 B*
1. Bobolink	1. Prairie Horned Lark
2. Meadowlark	2. Savannah Sparrow
3. Western Meadowlark	3. Lark Sparrow
4. Vesper Sparrow	4. Killdeer
5. Field Sparrow	5. Spotted Sandpiper
6. Red-winged Blackbird	6. Burrowing Owl

Birds of Northern Gardens and Shade Trees

No. 2 A	*No. 2 B*
1. Song Sparrow	1. Chickadee
2. Robin	2. Wood Pewee
3. Catbird	3. Chipping Sparrow
4. Baltimore Oriole	4. Red-eyed Vireo
5. Yellow Warbler	5. Yellow-throated Vireo
6. Flicker	6. Warbling Vireo

North American Game Birds

No. 5 A	*No. 5 B*
1. Ruffed Grouse	1. Gambel's Quail
2. Bob-white	2. California Quail
3. Wild Turkey	3. White-winged Dove
4. Dusky Grouse	4. Woodcock
5. Prairie Chicken	5. Canada Geese
6. Chachalaca	6. Mallard Ducks

Birds of Southern Woods and Gardens

No. 3 A	*No. 3 B*
1. Indigo Bunting	1. Mockingbird
2. Pine-woods Sparrow	2. Brown Thrasher
3. Pine Warbler	3. Cardinal
4. Orchard Oriole	4. Summer Tanager
5. Yellow-breasted Chat	5. Chuck-will's-widow
6. Carolina Wren	6. Barred Owl

Birds of Western North America

No. 6 A	*No. 6 B*
1. Wren Tit	1. Lazuli Bunting
2. California Thrasher	2. Blue Grosbeak
3. Nuttall's Sparrow	3. California Shrike
4. Fox Sparrow	4. California Purple Finch
5. Western Tanager	5. Plumbeous Vireo
6. Black-headed Grosbeak	6. California Woodpecker

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These Bird Songs are supplied as a service to amateur and professional naturalists. They make an ideal year-round gift and are a valuable addition to nature libraries.

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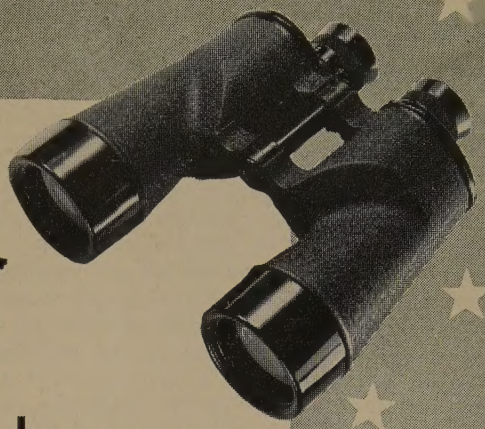

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Nature in Print

By HOWARD ZAHNISER

JOHN BARTLOW MARTIN, ex-newspaperman from Indiana, free-lance magazine writer of Chicago, went up to Michigamme in the Upper Peninsula of Michigan on a wedding trip some four years ago and became so interested in the country that he stayed long enough and returned frequently enough to know its people and its geography. Searching out its history he became convinced that "curiously, the whole Lake Superior region has been neglected by historians." With a feeling for the solitude that he says is part of the country's charm and with a respect for the wilderness character that it has always had, he has now fashioned out of his knowledge of people and geography and out of his sense of the needs of history one of the most interesting of the many recent regional volumes that have been published.

Curiously enough — granting the neglect of historians that Mr. Martin points out—his own book by the coincidence of publication falls between two other excellent volumes in The American Lakes Series, one dealing with Lake Michigan to the south and the other with Lake Superior to the north. For the general reader this whole region thus suddenly becomes one that can be vividly and comprehensively known, and enjoyable, too.

"Big country, wilderness country," Mr. Martin writes; "its heartland is the Upper Peninsula of Michigan. It is hard country. Though much of it is level, pocketed only here and there by rugged hills, it is all wild country, mining and lumbering country. Its boosters call it Hiawathaland, and it is true that Longfellow drew on the legends of the red men of the Upper Peninsula, but more Indians probably live here now than lived here two hundred years ago: the country was too tough even for the Indians. It is called cutover country and that too is true, but it is only a part of the story, the lumbering part. They call it copper country, iron country; those too are inadequate. Call it north country and let it go at that."

Thus Mr. Martin arrives at the title for his book, *Call It North Country: The Story of Upper Michigan.* It is a book written with regard for historical facts yet with great gusto. It sings the praises of the country's early surveyors (and they have been too little honored in other such writings), its lumbermen, its mining prospectors, its pioneer settlers. It tells lustily of the purveyors of strong drink and their ilk, who catered to the lumbermen and other strong men when they came to town. Yet it deals also descriptively and judicially with the region today and its problems—problems of economics, land management, recreation, and conservation.

Milo M. Quaife, the editor of the American Lakes Series, has himself written the volume entitled *Lake Michigan,* and it too is a book to praise. Like Fred Landon's initial volume in this series, *Lake Huron,* this book tells the history of the lake and of the land that surrounds it—a history that begins with the French explorers and the Fathers who accompanied or preceded them and ends with Chicago—in an excellent chapter called "Eighth Wonder of the World." Yet for the readers of this magazine *Lake Michigan* is a still more satisfying book, because of its natural history. A prelude, for example, sketches the geology of the region and summarizes a geographic description of the lake. Such natural descriptions as those included in a chapter on "Duneland"—where "the forces of nature have created a strangely beautiful world, endowed with a wealth of floral and faunal life"—are as pleasant additions as they are valuable. There is an entire chapter on wildlife, called "Forest Dwellers." We might with the characteristic hopes of conservationists question Mr. Quaife's statement that "the quail seems doomed to follow the pathway already taken by the great auk and the passenger pigeon to complete extinction," but we can be thankful that in writing such an excellent volume in so valuable a series he has been concerned with so many natural features.

Still more satisfying and delightful is Grace Lee Nute's volume *Lake Superior,* a statement that nicely enough can be made with no disparagement of Mr. Quaife's own work. He himself says of Miss Nute's *Lake Superior:* "In it she provides almost everything one could wish to know about Lake Superior from its first fashioning in the workshop of Nature uncounted millions of years ago to the current year of 1944. The lake has at last found a historian capable of measuring up to the inherent majesty and grandeur of the subject." After a reading of the book these words seem as judicious as they appeared enthusiastic at the outset. The volume is dedicated "To those who try to keep the forests green, the lakes full, and wildlife present about the shores of Lake Superior," and those to whom it is dedicated can indeed feel honored. Nor need those who are more particularly interested in local history, in industry, in shipping, and in all the other subjects that are so conveniently discussed in this series be disappointed, for here as Mr. Quaife says is "almost everything."

"No one," writes Miss Nute in a passage that aptly illustrates her integration of natural and cultural interests, "no one who has not seen the great Hull-Rust mine at Hibbing, Minnesota, can completely understand the genius of the United States and of Americans. Here is (sic) combined the overawing evidence of geologic forces reaching back into the earliest years of this planet—for this is a part of the earliest land mass on the globe—and the result of man's genius in utilizing the product of those forces. Here is a great hole dug in the earth by man, leaving scars that for beauty of color and color combination are unsurpassed. . . . Against such a backdrop of color and line, pigmy men and railroad locomotives. . . . If the work in this hole should stop for one day, disastrous effects would be felt around the globe."

Miss Nute can effectively describe the historic, geographic, and economic importance of Sault Ste. Marie, but she also knows that here is one of the "major centers of secondary bird flyways," and she can refer to an interesting east-west migration of evening grosbeaks and purple finches. She knows the twinflowers blooming along the southern shore of Lake Superior as well as she knows the great ore boats on the lake, and she is capable of remarking: "It is fitting in this land of Scandinavians that the favorite flower of the great Swedish botanist, Linnaeus, should grow here in such profusion." Miss Nute knows the history and lore of the lumbermen, but she also

Winter Wood

By ROBERT AVRETT

There is a grandeur in a winter wood
No green-clad forest ever in the spring
Can wear, nor autumn trees, though each boast hood
Of gold and scarlet worthy of a king.

For trees in winter stand erect and proud
As Grecian statues of heroic mold,
Their single garment like a snowy shroud
Scarce veiling limbs impervious to cold.

It seems a primal honesty in trees
Disdains concealment, and their rugged length
Is stripped for conflict, with the careless ease
Of Titans sure in knowledge of their strength.

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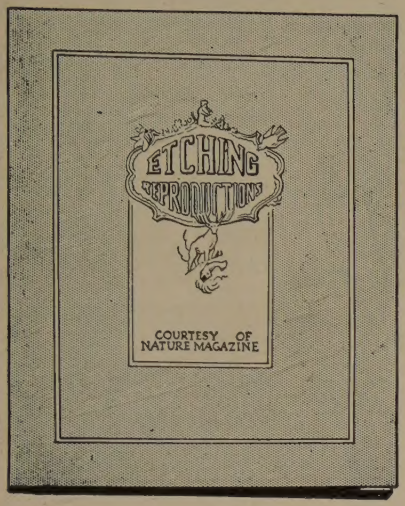

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knows that "between the sand dunes to the east of Marquette and the Huron Mountains to the west lies the countryside made famous by the wildlife photography of George Shiras, III."

Lake Superior is a model volume for authors of books on lakes, on rivers, on mountains, on geographic regions. There have been many such books written in this country during the past decade, and the authors of nearly all of them could have profited greatly through a reading of Miss Nute's work if it had been available. There are many more such books to be written and published, we do hope, and we can also hope that their authors can see in this volume how a knowledge of natural history and a consciousness of its facts in writing can add to the validity of a work as the description of a natural area, even though the concern is primarily with man and his culture.

Miss Nute's volume on *Lake Superior*, Mr. Quaife's on *Lake Michigan*, and in between them Mr. Martin's *Call It North Country* do indeed provide an excellent, comprehensive and vivid discussion of this interesting and important region. Mr. Quaife in his introduction to Miss Nute's book quotes one observer of America commenting that "we know the Sea of Galilee better than Lake Superior, and can recite the marvels of the Lake District of England without knowing that the Lake District of America is more marvelous." Mr. Quaife declares that if this is true in the future "it will not be the fault of Dr. Nute," and we can add regarding the whole region of this discussion "nor that of Mr. Quaife himself and John Bartlow Martin."

Call It North Country: The Story of Upper Michigan. By John Bartlow Martin. New York: Alfred A. Knopf. 1944. 281 pp., with 43 photographs on 20 plates, 3 maps (including tipped-in folding map), bibliography, and index. $3.50.

Lake Michigan. By Milo M. Quaife. Indianapolis and New York: The Bobbs-Merrill Co. 1944. 384 pp., with 32 photographs on 22 plates, front end-paper map of Lake Michigan, back end-paper map of the Great Lakes, footnotes, bibliographical note, and index. $3.50.

Lake Superior. By Grace Lee Nute. Indianapolis and New York: The Bobbs-Merrill Co. 1944. 376 pp., with 33 photographs on 22 plates, end-paper maps of Lake Superior and the Great Lakes, bibliographical note, and index. $3.50.

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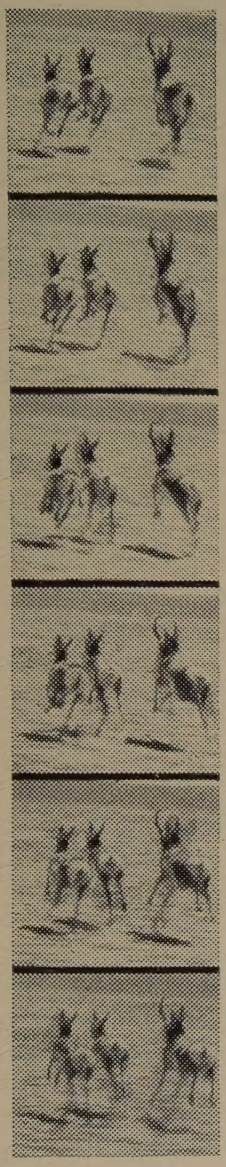

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Contents Noted

We feel a particular warmness for the Better Vision Institute, a glow kindled by their monthly press releases. Someone in that organization is a red-hot Nature enthusiast. In a recent batch of six mimeographed pages of releases we find a page about the water ouzel, or dipper, and the manner in which it has adapted its eyes for under-water use; an analysis of the five different kinds of eyes—so far as light is concerned—found among animals; an item on the "winking" fish, which does not wink but rolls its eyeball down in a way that simulates a wink. Then there are a couple of pages of interesting short fillers, mostly about Nature, conveying such various information as that the eyes of a horse are the largest of any land mammal; that the king penguin's eye pupil is a perfect square when fully contracted, a hexagon when half dilated and a circle when fully expanded; that owls do not have eyes with slit pupils and the black skimmer is the only bird that does; that the polar bear has a thin membrane, a sort of third eyelid, to protect from snow blindness; so does the reindeer.

We are currently serving as a juror in the District Court of the United States, Criminal Division, a fact that may not be truly pertinent here except that this is a personal podium, and we feel rather strongly about jury service. Although court procedure seems often to be hopelessly tangled in the web of law, seemingly wasteful of time and money, it is a process of free government. And we feel that jury service is both a duty and a privilege of a free people. It is one of the things for which we are fighting.

Never a day passes but we are amazed at the multitude of phases of a global war. Now we learn that we have an agricultural emissary among the South Pacific islands. He is H. H. Warner, whose job is growing a wide variety of American vegetables on those islands so that the boys may get their fresh garden produce. And gardening out there is on a large scale, done with native labor, plus help from fighting men when opportunity offers. Tractors and other refinements of farming are available. Corn, tomatoes, watermelons, cucumbers, eggplant, peppers, radishes, Chinese cabbage and cantaloupes are among the crops grown. Some of the plantings are so close to the fighting that Jap patrols have been flushed in our corn fields. One island, Mr. Warner reports, is a farmer's paradise. The kangaroo grass on vast level plains is turned over for the first time, easily killed by one plowing or disking. The soil is rich and black with nary a weed seed in it. No fertilizer is necessary. There are no corn earworms, few aphids, no melon flies. Worst pests are chewing insects. Thus we fight a war—and change the eating habits of the natives of the South Pacific in the process.

Long ago it was recognized that the automobile is a mighty dangerous and lethal instrument in incompetent hands. So examinations in ability to handle it, and in knowledge of the laws surrounding its use, were required. Sportsmen have for some time debated whether a comparable examination should be demanded for hunters. One of the hunting and fishing magazines recently asked a jury of nine eminent sportsmen to vote on the question. Seven favored examinations; two opposed them. The majority felt that such a policy would reduce the number of hunting accidents and cut down the number of unintentional law violations. The dissenters claimed administering the examinations would be too much for the personnel of fish and game departments, all understaffed, and that no test would eliminate the incompetents. They pointed to the great toll from automobile accidents in spite of the tests for fitness, which cannot eliminate carelessness or just plain dumbness on the part of the driver. Being gun-shy ourselves, we are in no position to judge. What do you think—and why?

When we commented editorially about the Ohio "circle" fox hunt that recently created such a furor, we urged that regulation of over-population of foxes be cared for by scientific control by qualified individuals, not by sadistic displays of killing. We are happy to note that the Michigan Legislature recently gave the State Conservation Department twenty thousand dollars to trap the animals where losses are excessive, as well as to instruct farmers on how to trap them. Bounty payments were turned down because the trapping method proved most successful in handling coyote surpluses in 1937 and 1938. R. W. W.

". . . a combination that one might expect in a Land of Make-Believe, but not in Carolina on a winter day; not a hummingbird perched on a holly wreath, gazing through the window at snow drifting lazily down!"

"Later we fastened vials of sweetened water and of diluted fruit juices to ferns and other plants and objects in the different rooms, and Ariel greedily made the rounds."

Ten Days with Ariel

By CHARLOTTE HILTON GREEN

Illustrated by Walter A. Weber

RUBY-THROATED hummingbird, red-berried holly and soft white snowflakes! Surely, that is a combination that one might expect in a Land of Make-Believe, but not in Carolina on a winter day; not a hummingbird perched on a holly wreath, gazing through the window at snow drifting lazily down!

Yet all this was seen by us in December of 1934 in Raleigh, North Carolina. Nor was it a hummer that had been a house-pet throughout the fall and winter. Except for the Gulf Coast region, our December 7 date for a ruby-throat to be seen out-of-doors was the latest for the region, according to Frederick C. Lincoln, authority on bird migration.

In fact, we were doubting Thomases ourselves when a telephone call informed us that an acquaintance had picked a numb-with-cold hummingbird from a vine in her garden, and not knowing how to care for it, had brought it to the "Bird Lady." As we had not been home, she had left it, in the shoe-box in which she had brought it, with our neighbor. Had we received it?

We had not. And, we objected rather untactfully, it just could not be a hummingbird. The latest Raleigh record for one (from bird records kept for nearly fifty years by our dean of birdmen, C. S. Brimley) was October 19, and the average date of departure of hummingbirds was two or three weeks earlier. It must be a ruby-crowned kinglet, which is our smallest winter bird.

Indeed not, came the indignant reply. It was a hummingbird . . . she knew that much about birds!

Dashing over to the neighbor's in quest of the mysterious December hummer, we hurried back along the woodland path, stopping to listen now and then for a sound from the closed box. Not a sound, not a movement. Probably the poor bird was dead by now. We tried peering through the small holes punched through the cardboard for air, but could see or hear nothing.

Once inside the house we drew off the cover, and out flew a bird. It *was* a ruby-throat, and upon catching and examining it carefully we saw it was a young male, with just a glint of ruby here and there on his throat, and some of the tail-feathers still faintly tipped with white. It was in a later transition plumage of the young male than is usually seen

"Suddenly remembering, we rushed into the living room. There was Ariel, hovering above the fire. Once more the Head singed his hand in rescuing a bird from the open fire."

by bird lovers and ornithologists in the states. The tail was much more like that of an adult male than like that of the adult female, which the young male ruby-throat more closely resembles at the time it leaves the States for its winter home.

Apparently an hour or more inside the box in a warm room had revived the bird from its numbed condition, for it seemed lively enough as it flew about our living room, perching on picture frames, on the stiff tops of draperies, on lighting fixtures. Hurriedly we mixed a vial of diluted honey water, and, raiding an old summer hat, fastened a scarlet flower around the neck of the vial and attached it to a spray of bright, red-berried, deciduous holly on the mantel. It did not take Ariel—as we named him in that first hour—long to find his dinner, and he took almost continuous hungry sips. It was no dainty hummingbird feeding, and we wondered just how long he had been without food, for there was not much in the out-of-doors of that December for him to find. And where, we wondered, could he have been all the time? That mystery was never solved.

Later we fastened vials of sweetened water and of diluted fruit juices to ferns and other plants and objects in the different rooms, and Ariel greedily made the rounds. But the honey water remained his favorite until the Head (my husband) later, during an emergency, concocted a still more ravishing "swig."

Dinner was late that night, and we had been so absorbed with our new winged pet that while we were both momentarily out of the room a near catastrophe almost claimed our tiny sprite. We had lit a blazing fire in the hearth, and open fires, we have learned, seem to have a fatal lure for wild birds brought into a house. In our present excitement we had forgotten about the night a bluebird had flown against the lighted window during a bitter storm, and when we opened the door it had flown in and gone straight to the open fire and hovered above it, seemingly unable to fly out. The Head burned his hand badly that night, rescuing the bird. Another time, during a bird-banding operation, a white-throated sparrow escaped, and, dashing to the open fire, had gotten caught behind a log and, before we could get at it, was burned to a crisp.

And now, in our excitement over Ariel, we had forgotten that one of us had brushed against the fire-screen and knocked it over. Suddenly remembering, we rushed into the living room. There was Ariel, hovering above the fire. Once more the Head singed his hand in rescuing a bird from the open fire. But Ariel appeared unharmed. Apparently he had just flown to the fire as we entered the room.

Our tiny winged sprite soon became a regular member of our household, with full run of the rooms except the kitchen, where we feared the gas stove might prove a danger. For Ariel explored everything and tried every possible place for a perch, settling after a day or two on a few favorites. The open fire, always tightly screened now, was always a fascination for him, and one of his unique roosting places, at night, as we sat by the fireside reading, was the toe of the Head's shoe! He would sit quietly, and was always careful not to get up abruptly when Ariel was "at ease" there. Again, he would fly over to my shoulder, or sometimes to my head. And when I combed my hair in front of the long mirror, he would sometimes fly around, poise a moment, then insist on making a landing, and operations would have to cease until I shooed him into the other room and shut the door.

Ariel was so busy investigating his new home and becoming a member of the family that he refused to

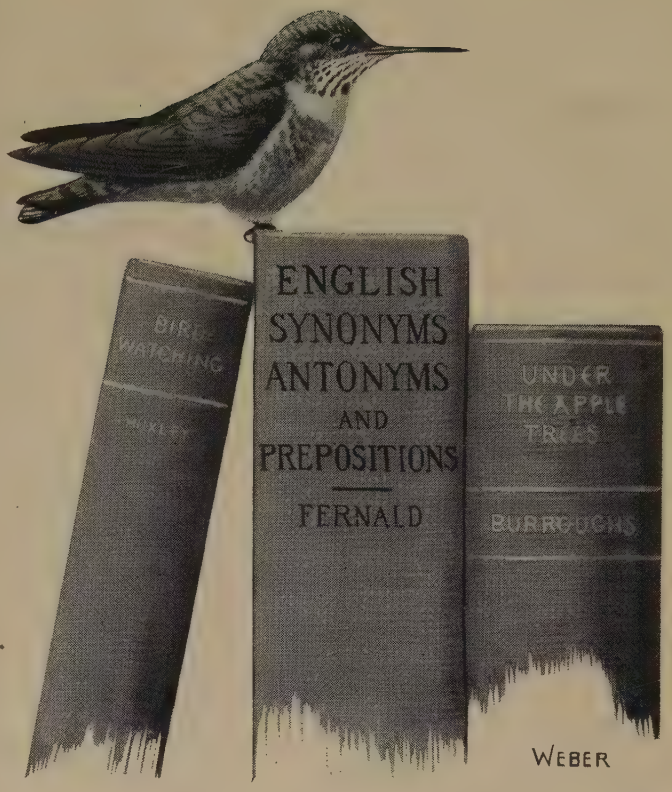
have much to do about getting food on his own. The day following his arrival we had gone out and practically raided the greenhouse of the college where the Head taught. We bought a gorgeous poinsettia that we were sure would appeal to our small winged guest. Looking around for promising flowers, Jim Weaver, of the Horticulture Department (and a sort of fairy godfather to our Garden Club movement which, of course, includes bird study), recklessly snipped sprays of snapdragon, of scarlet salvia, of fuchsia, of anything that might appeal to a hummingbird. We went home with an armful of flowering loot.

But did Ariel look over this new wealth and offer a small bird's grace? He did not! Although he rather half-heartedly went exploring and took a negligent sip or two of the nectar drops on the scarlet poinsettia, and flew once to the snapdragon, he was entirely too wedded to his new way of life to change. Apparently the ease of getting his long swigs of honey water and other delicacies suited him to perfection. Or perhaps he was becoming demoralized by a sort of bird relief!

Ariel reigned over quite a royal court. The children of the neighborhood adored him and came many times daily to see him, and bird lovers from town came out, even some of the Museum folks and dignified professors from the college. One of them, a zoologist, thought we should put him in another airy shoe-box, take him to a south-bound plane and ask the pilot to release him in southern Florida. For, although Ariel seemed contented enough if his new family were about, especially if the fire were going and the lights on over the mantel, when we were out of the room for a time he would fly to the big windows and whirr back and forth, back and forth, as though seeking an escape to the outdoors. We were in a woodland setting and the big triple windows had no curtains, only draperies at the side. Our house, built before the days of fuel-oil rationing and tight, weather-stripped windows, was cold and drafty about the windows, especially. We would get Ariel away from them by waving him back with a folded paper, or by putting the lights on over the mantle. Lights of any kind had a great attraction for him.

But there was no getting around the fact that the great outdoors appealed to our small guest. Did some vague instinct whisper to him of a southern home, perhaps in far away Mexico or Central America; a winter home of his kind, but which he had never seen? Apparently it did, and how strongly it must have called him!

Still, although we, too, grieved over his imprisonment, we felt doubtful of his living through a long trip to Florida, and we knew he could not survive outdoors in the winter of that year. We hoped he would be more contented in his new surroundings. In a couple of months or so, Dr. Arthur A. Allen, Head of the Laboratory of Ornithology at Cornell University (under whom I had studied), was to start



". . . perhaps he had ideas of becoming a writer himself, for he seemed to prefer Fernald's *Synonyms, Antonyms and Prepositions.*"

on a long southern trip to make moving pictures and sound recordings of birdlife. He and his party were to stop with us for the week-end, to lecture at the college and show some of the first sound-moving pictures of bird life. We had great hopes of Dr. Allen getting some good ones of Ariel.

For Ariel was no modest, silent little fellow by any means. We had not realized that hummers were so noisy. He had a sharp, penetrating little chippering that he kept uttering so constantly that at times, if we were trying to read or write, it became disturbing and we would "send him to bed." To do this we merely put out the lights in the living room and turned them on in the adjoining study, and he would follow the light. Then, if it were late and time young birds were getting their beauty rest, we would turn out the light and slip out quietly, and usually he would settle down for the night.

One of his favorite roosts for sleeping was a sycamore twig thrust through a ceiling lighting fixture. Or he would settle down among some of the books in the open cases, or on one of our two desks. The children of the neighborhood thought it would be amusing if he would roost on my—at that time—rather recently published *Birds of the South,* and so they insisted on placing it in a most convenient position. But apparently Ariel was a more scholarly bird than that, or perhaps he had ideas of becoming a writer himself, for he seemed to prefer Fernald's useful *Synonyms, Antonyms and Prepositions!*

But Ariel was not always a well-behaved bird about going to bed. Sometimes he was just "fractious" as our colored mammies say, and would squat on the floor of the study by the lighted crack of the closed door, ready to slip out if anyone went into the room. Fearing we might step on him on some such occasion, we had always to remember to go into the study through another room.

And then one night we slipped in quietly, and Ariel was not in any of his usual places. We searched everywhere. We called. Carefully we pulled books out from the open shelves, searched among filing folders and piles of professorial papers, under the desks, moved out the great chest, shook the draperies. No Ariel. Had something happened to him? We called anxiously, but there was no answering chippering. We went over everything carefully again. We became worried. Could a mouse have crept up on him as he slept? Surely, if so, there would have been signs of a struggle. Could he have crawled through, or slipped through, one of the open spaces in the old-fashioned floor register? We pulled it out, and, thrusting our heads down the big pipe, called anxiously "Ariel! Ariel!"

No answer.

Finally, with heavy hearts we went back to the fire-side. Later I returned to the study to finish my weekly out-of-doors column—that column, already partly written, that was giving such a gay account of our Ariel.

It must have been the clicking of the tyepwriter keys that disturbed his slumber, for I heard a faint, dry rattling noise, as of dried paper, and, thinking it must be a mouse, turned quickly. It seemed to come from the back of the long mirror above the old chest. I pulled it out. There, in a snug little nook where the paper had become loosened from the back of the mirror, was Ariel! He had found a new sleeping place.

Hummingbirds, we knew, feed also largely on minute insects, and we tried to find some for Ariel, but this was not so easy in December. We thought that was probably what he was searching for when he hopped, industriously, along the cracks of the floor and pecked at them—a soft pine floor that had shrunken, leaving wide cracks. He never walked forwards, but always seemed to sidle side-wise, with a funny, awkward little gait. Thinking he might be missing "meat" in his diet, we tried to approximate it by making him a thin beef broth, but he just ignored it.

And then came a time when we had to be gone for the day. We filled all the vials and arranged for Ariel to have the run of the house, always excepting the kitchen. He would be safe, we told ourselves. But we made the grievous mistake of not leaving the lights on over the mantel and of not pulling the shades down over the big windows. Evidently he spent much of his day whirring frantically in front of them, as two or three neighbors who had called at different times reported seeing him thus.

That night we could tell he was not well. His chippering sounded wheezy, he seemed less alert, and his head was sticky where he had thrust it too deeply into the vials, and he did not preen his feathers or groom himself as usual. It was very evident that Ariel had caught a cold.

I made a milk egg-nog, and the Head, thinking he might be a discriminating young feathered blade, put a "stick" in it. And did it buck him up? Most definitely it did! Our Ariel became the worst kind of a toper, passing up all other vials for this one, even the first favorite of honey water.

For a couple of days he seemed to improve, and then we could see he was failing. We called some doctor friends, but none knew what to do for a tiny hummer with a wheezy voice and drooping spirits. He played less often now. Only occasionally did he come to gaze at the open fire from his ring-side seat on the Head's toe. He lost all interest in my hair-dos, and only once, on the last night, did he come and perch on my shoulder, snuggling down something like a tired child who was not feeling very well and wanted to have a fuss made over him.

It was December 7 when Ariel had been brought to us, plucked from near death on an inhospitable, dying vine in a city backyard. And some time on the morning of December 18—just a week from that Christmas Day we had thought he would celebrate with us—he slipped away to whatever gay-flowered ways hummingbirds may have in a Birds' Hereafter.

Interesting, fascinating and busy had been the ten days he had spent with us, days in which we learned much of hummingbirds' ways. He gave happiness and much of bird lore to countless children and friends who came to see him. And now, perched on a twig, he looks down upon me in a different study but in much the same position he used to take in the old one.

O Ruby-Throat!

By JUSTIN K. WEGER

O Ruby-throat, sublime and swift, so fine
In form that fairies have not for themselves
A word of praise, approach our trumpet vine,
Which harbors in its golden blooms the elves
That blend the nectar for your dainty tongue.
We pay them well for doing this for you,
And you repay us well with thanks unsung.
O songless one, continue as you do,
Just flit your wings which seem to hum to us
A thank-you. Darting chases, too, give grace,
For when you guard your realm so fabulous
You glitter in the sun, which, out in space,
Shines down to make you gemlike. Come, and nest,
Most gorgeous bird, belov'd exquisite guest!

The Night of the Shining Tree

By ELLSWORTH JAEGER

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IN THE little adobe churches in the out-of-the-way villages of the Sangre de Cristo Mountains of New Mexico are revered little figures of the "Santo Nino," the Christ Child. They stand in sacred niches in the mud walls. The Mexican folks say Santo Nino often leaves the little mud churches, journeying forth to watch over the affairs of men. Usually he wanders about in the guise of a ragged little beggar child. And this is the story—a story of Christmas—that they tell:

As the last angry red disappeared from the stormy winter sky, a ragged little beggar boy painfully made his way through the winter woods. His feet were raw and bleeding. His footprints were dark against the white of the snow.

He looked in vain for the twinkling light of some isolated hut. But everywhere it was cold and silent; the darkness deepened. At last he came to a grove of beautiful regal trees. There were rugged black oaks, some that were ashy-gray, and soft blue-green balsams. The oaks still held their leaves and the beggar child said, "Please, goodly trees, will you not give me a few of your leaves with which to make a bed?" But the oaks and beeches only clutched their leaves more tightly.

However, the balsam whispered to the boy, "Come hither." It bent its protecting branches, making a windproof shelter and a bed. Seeing the ragged cuts on the feet of the beggar boy, it soothed the wounds with its life-giving sap. And the wind rubbed the balsam's branches together and a flame burst forth, warming the ragged child. Overcome by fatigue, he dropped into a deep slumber. The balsam protectingly wrapped its branches closer above the sleeping form.

Then a miraculous thing happened. Soft, shining lights of myriad colors danced all about the balsam's branches. And, most wondrous, each tiny colored flame became an elfin angel. Beneath the drooping branches, where the beggar boy slept, it was softly warm and quiet. Even the winter gales trod softly as they passed this bower. All the forest creatures were wide-eyed with wonder and tip-toed softly around the shelter.

Early, when the rose color touched the dawn sky, the beggar child awoke. He smiled softly as he saw that the balsam slept, its protecting branches still about him. He breathed in the sweet perfume of the balsam needles. And, as he saw the shining elfin angels dancing among the branches, he said, "Oh Shining Tree, I am grateful to you for your gifts." Then he pulled off his ragged garments and stood forth arrayed in a shining golden mantle. He said, "Since you have given freely of your gifts and love to a humble beggar boy, you have given them unto me, The Christ Child. Henceforth, you shall be known to all of goodwill for your gifts. Your life blood shall forever have healing powers; your heart wood shall forever have the fire of life within it, even though it be dead. Your branches shall always provide a couch and shelter to the weary, and every year on this night colored lights of beauty shall adorn your branches, so all may know you truly as 'The

Shining Tree', in memory of your act of mercy."

Saying this, the Christ Child turned to the oaks: "And to you, oh greedy ones, who begrudged a few leaves for bed to a poor beggar child, you shall keep your leaves, but they shall be yellowed and withered, so that all may see what grasping folks you are." And then he left in a beam of the morning light.

The balsam sighed in its happiness, for it knew that, forevermore, men would use its healing balm for their wounds; its aromatic branches and needles for couches and shelter. To the knowing ones, fire would always spring forth, even from its dead wood, when its branches were rubbed together.

So today, when Christmas Eve comes, we set up the balsam in our windows and adorn it with colored lights in remembrance of the Shining Christ Child.

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The Christmas Bees

A Legend

By ULRICH TROUBETZKOY

On Christmas Eve the bees awake
to swarm and tremble into songs
as each assumes the single note
in whose vibration it belongs.

Since that most blessed ancient dawn,
they break the silent interim
when they assemble in delight,
continuing their ancient hymn.

And then the frail white bees of heaven
may gather in the night to fly
on cool and gentle wings to earth,
bringing their music from the sky.

On Christmas Eve all creatures speak
in human words the love they bring
to their new King, but only bees
achieve this miracle and sing.

★

Preserve Bloodroot

By EDWIN F. STEFFEK

ONE of our most charming native plants, and one that should be saved from extermination near our centers of civilization, is the bloodroot, *Sanguinaria canadensis.* Early in April or May its beautiful white blooms literally pop up from the rich stony soil along shaded roadsides, copses and the edges of woodlands. However, it need not go the way of many of our rarer plants, because it is very tractable and is at home under such conditions all the way from Nova Scotia to Florida and west to Nebraska and Arkansas.

It grows from a stout horizontal rootstock one-half to one inch thick. This is densely clothed with thick feeding roots. If any part of the plant is injured, it exudes a reddish sap once used by the Indians as warpaint and later by the whites as a cough remedy. It likes a fair amount of shade in summer, but is not too fussy about the soil so long as it contains a reasonable amount of leafmold and is somewhat moist. Transplanting may be done at almost any time, if one is careful, but late summer when the leaves begin to die down is best. Propagation is readily accomplished by division of the rootstocks at this time, or by seed sown one-half inch deep in a light sandy-humus soil as soon as it is ripe. The seeds will germinate the first spring, and the plants should flower the second year. One must watch carefully for the seed when it begins to ripen, for both mice and ants seem to like it. Root cuttings may also be used in late summer to multiply the plant. Mulch with leaves.

This is one of the easiest of our wild plants to cultivate and, therefore, one of the best with which the amateur may start his garden of wild flowers.

A G.I. bird student on the Italian front reports on—

Birds Under Fire

By WINSTON WILLIAM BROCKNER

Illustrated by Ellsworth Jaeger

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For years I wondered about the effects of war upon birds. Thanks to Hitler and company, the "opportunity" was thrust upon me to observe first-hand conditions in one theater of operations.

In my period of training and preparation in the States, we frequently heard of instances where wildlife, and birdlife in particular, suffered serious consequences due to aerial bombing, machine-gun and artillery practice. Through negotiation by far-sighted conservationists and intelligent Army officials much of this slaughter was held in check or stopped entirely. A case in point is the salvation of the nearly extinct trumpeter swan at Red Rock Lakes, Montana. A military range had been planned for this area, but through the prompt intercession of conservationists and cooperation of military authorities, a catastrophe was averted.

Before a man gets into combat, he is likely to have preconceived ideas as to what the front will be like. I believe that most of them are quite similar. You picture a line extending all along the front with G.I.'s almost shoulder to shoulder Such is not the case! Fighting here in Italy mainly follows the roads, highways, railroads, streams, villages and cities. Relatively little cross-country fighting is done. Hence, concentrated regions of birdlife are generally by-passed. From what I know, little combat hit the main part of the Pripet Marshes of the Russo-Polish border, and very little hit the Pontine Marsh of Italy, which I went through five days after it was cleaned out.

Before mentioning combat observations, one or two from the States must be mentioned. While in basic training at Camp Croft, South Carolina, I spent a week on the Garand rifle range. Half the time was spent on the firing line and the other half behind the targets, marking. It was behind the targets that my first opportunity for studying birds under fire was presented. The targets were directly over our heads, and the spent bullets were dropping from twenty-five to one hundred and fifty yards ahead of us. Many of the richochets zinged only a few yards around us, and a few even dropped by us.

Immediately in front was a shallow valley grown up to pine and scrub growth. So many bullets had pierced the air that the tops of every pine had been neatly chewed off. However, even with the constant barrage, I was surprised to observe five or six cardinals tuning up on their mating calls. During the heaviest barrages it was not unusual to see these beautiful birds on a limb of a willow singing unconcernedly. The noise and whizzing bullets seemingly affected them not at all. With them, and just as brave, were song sparrows, white-throated sparrows, slate-colored juncos, bluebirds, chickadees and tufted titmice. Every now and then a turkey vulture would dip by. It was almost miraculous they were not hit.

This same normal behavior was noted on other ranges. While on the machine-gun range, flocks of meadowlarks and mourning doves would alight on the field close to the target. On this same area, a Carolina wren increased its singing while the guns were being fired. Here, too, the turkey vultures continued their charmed flight.

It is under actual, indiscriminate combat fire, however, that we wonder what happens to birdlife. Frankly, there have been times in which it was ut-

terly impossible for me to observe what was happening. One such incident was an afternoon we were caught in a ravine. When we first entered things were quiet. Swallows were swooping haphazardly in search of food. Goldfinches were twittering from the trees. All of a sudden all hell broke loose, and the Germans were shelling the daylights out of us. Without invitation, I flung myself into a ditch with water in the bottom. That was my salvation. Six inches over my head, tree boles were being rent as a man breaks straws. The valley became permeated with shrapnel. Every now and then, during a welcome lull, I would very cautiously turn my head over and look up. Overhead the swallows still swooped, and nearby the goldfinches kept singing. One would have thought, surely, that with all the cascading shrapnel the birds would either have been killed or paralyzed with fear.

Similar incidents produced the same reactions. One evening, while we were bivouacked near some tanks, the Germans commenced to toss armor-piercing shells at them. These shells, unless they hit their objective, do not explode and shrapnel out, and make very little noise in coming through the air. Some hawks were circling in the air at the time and were not disturbed in the least by the onrushing shells. I have witnessed enough of these shellings to convince me that the birds are unaffected by them. I wonder if it is because the projectiles go through the air too fast to be seen.

In a fairly large town one day, during shelling and while debris was falling from adjacent buildings, swallows and swifts still continued to fly unconcernedly. Sometimes I think that these birds relish the situation. Often areas that are bombed out seem to contain more birdlife than those that are not. Maybe the stark, grotesque scene serves to emphasize these bits of flying life. Some cities were so throughly bombed out that even the swallows could not find nesting sites. Huge flocks of these birds would hover pitifully over the spot where their nesting site had been located. This is an instance of serious set-back to the population of one species. One town just north of Anzio was levelled during the height of incubation. New nesting sites in adjacent villages and cities were impossible to find. I make bold to say that the swallows and swifts of central Italy found it pretty nearly impossible to produce young this year. This is the greatest ornithological casualty I have witnessed due to war.

I have ever been on the watch for remains of birds that were hit by shrapnel or stunned, but have found none. In what is left of the Pontine Marsh, I found nesting activities proceeding at a normal pace. If anything, they were improved, since the Germans shut off all pumps and soon all the area was flooded. Of course, this undoubtedly resulted in a high toll in song birds nesting on or near the ground.

If the birds were not being perceptibly hit, I next wondered about the effects of sound. From my observations, sound had no effect upon them whatsoever. One evening, I was up at an observation post. While there, our artillery shells were passing not too far over our heads hitting a nearby target. The fire was heavy and persistent; hundreds of shells came whistling terrifyingly through the air. All the while this heavy barrage was passing over, swallows, swifts and nightjars continued to fly around. The sound did not bother them.

I have not been close enough to the muzzle-blast of our big guns to see if anything is caught in them. However, I doubt if there is a high toll from this action.

Is food lost through the war? On the contrary, it is no doubt as plentiful, if not more so. Surely the insect population has not suffered. Many times I have seen carcasses decaying in a field. This seems to have increased the number of insects. In the bigger cities shelling has been so thorough that it exposed the sewerage system, thus affording more breeding sites for mosquitoes. All of which spells more food for birds.

This is the situation as a bird enthusiast observed it in Italy. In other theaters it may be entirely different. The most serious losses, I should say, are of actual nesting sites and stoppage of incubation. Beyond that, birds seem to show a remarkable degree of adaptation to warfare and great recuperative powers.

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Frost

By COSETTE MIDDLETON

I like the way these winter dawns express
Themselves on window panes in plumes and swirls,
Beyond which gleams a gentle wilderness
Where all is white with tiny powdered pearls.
The tangled weeds are filigreed with frost
Like labyrinths of crystal and of lace;
And every trampled blade of grass is lost
Beneath the tide of silver. Field mice race
Along the beaded tunnels of the briers
And through the thicket's maze of woolly skeins;
Tall posts are sheathed in rime, and singing wires
Are fringed with little diamond-misted grains.
There is no greater eloquence, I know,
Than sun and frost setting the day aglow.

Baby scorpions of the species *Vejovis spinigeris* at home on mother. Note that the heads of most are directed toward the body of the mother, and that their bodies are plump with yolk material.

Do Baby Scorpions Eat Mother?

By HERBERT L. STAHNKE

War has carried American men to the far corners of the world—to lands where the animal life is strange, and becomes a subject of interest. Indeed, it has made Nature students out of many, although not always accurate ones. In the tropics and sub-tropics the fighting man has met many strange things that crawl, among them scorpions. As a result of my work with these and other poisonous animals, many interesting questions and odd assertions have come to me, and one of the most frequent concerns the feeding habits of scorpions.

"Did you ever watch how the mother scorpion carries the young on her back?" asks one correspondent, adding, "The young feed from her body until she dies." Another declares, "At least in some cases the young turn cannibal and eat the mother." Still another is certain of his observation when he writes: "Before birth of her offspring the mother, by means of her pinchers, transfers a substance from her mouth to her back. . . . Six days later finds the young in their respective places, their mouths still contacting the food on the mother's back." And there are many who would consider the matter closed and no longer subject to question, having read in Ripley's "Believe It or Not" that: "The scorpion is the finest example of maternal sacrifice. She feeds her young with her own body."

Human observation of the things of Nature can easily go astray—and does. The scientist will not trust one sense or one bit of evidence. So he will pick up a scorpion to discover that its body covering is tough and difficult to cut or tear with forceps or scalpel. He will study the mouth parts of the young scorpion and discover them to be weak and incapable of penetrating this tough "hide." Eating mother would appear to be an impossible task.

The "saddle-cloth" revealed the parent scorpion having died of starvation while carrying the young. The ragged appearance is due to many tiny exuviae left by the baby scorpions. The young, having used up their supply of yolk material, shift for themselves. They did not eat mother.

The trained biologist, looking at the plump baby scorpions, would see them as a store-house of food. And they are found to be crammed with yolk material that serves as food while they are riding around on mother's back. Before they leave the pickaback stage they shed the cast-off "clothing," this being carefully placed on the mother's back as a sort of saddle cloth. After the first molt, when the young become replicas of the adults, they become hungry, and when their appetites are urgent enough they leave the parental "roof" to seek tiny spiders and any small, soft-bodied insects. Since food is not plentiful, the survival rate is low.

One observer, convinced of the matricide story, brought in a scorpion laden with young. He pointed to the ragged edges of the "saddle cloth" as the eaten side of the mother. The young were carefully removed, to show mother intact. This observational error seems to be the main source of the "mother-love" tale.

Another basis may lie in the fact that the adult scorpions can be—and are—parasitized by a fly that lays its eggs on the scorpion's body. The larvae hollow out the body and the scorpion dies, even though the young may still be riding around. The young would not necessarily leave the body until they were hungry enough. The inexperienced observer would, of course, be completely and finally convinced that the mother served as food for her young.

In order to clean their body surfaces from waste materials, the scorpions will often spread secretions from their mouths over their bodies. Scorpions soon to bear young are often quite fastidious in this respect. But this secretion is not a food. Even if it were, the amount would hardly sustain from twenty to sixty young for from a week to three weeks.

So, Ripley and many amateur observers notwithstanding, mother scorpion does not sacrifice herself for her young. There are, to be sure, some 625 known species of scorpions, and all have not been completely studied. There may be a species that has developed this relationship. But the evidence thus far shows that young scorpions follow the usual pattern of behavior found generally existing among other related groups.

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One Who Foresaw

Three-quarters of a century ago there was at least one conservationist among the throng of exploiters who ravaged the western plains. He was Granville Stuart, author of an interesting book, *Montana As It Is,* published in 1865. All Nature appealed to him, the landscape and plants, the beasts, the birds, and the fishes. Of the Green River near Fort Bridger he wrote, "But now, alas, the Goths and Vandals of civilization (i.e. the emigrants) have almost exterminated the beautiful groves of cottonwoods that once fringed its banks, and their vast annual swarms of stock have devoured the grass year after year till it has quit growing out of sheer despair of ever reaching maturity, and they have browsed, trodden down, and almost worn out the fine growth of willows that once lined the stream, leaving a dismal waste where once a beautiful landscape made glad the heart of the wandering trapper and hunter."

He deplored the extirpation of the buffalo and confirmed the tragic waste of which that animal was the victim. "All white men passing through the buffalo country," he noted, "slaughter them in a manner that is perfectly shameful, often shooting down hundreds of them and leaving them, hide and all, to rot on the plains. The Indians, also, incited thereto by the fur companies, kill annually hundreds of thousands more than they want for their own food and raiment, for the purpose of getting the robes to trade to the whites."

Other large animals were persecuted almost equally severely. Of those living on a mountain called Buffalo Hump, Stuart recorded that, "It was the fall and winter residence of many bands of mountain sheep, before the advent of the whites, who have about finished them. In fact the game is rapidly becoming extinct, owing to the indiscriminate 'murder' of it, in and out of season. It made me mad to see the shameful manner in which the people of every class hunted down and killed game of all kinds during the past winter, when it was absolutely too poor for anybody to eat. Every cabin had three or four deer and elk, &c., hanging on it, which toward spring were thrown away. Many thousands were killed and thrown away; very few of the hides even were saved."

Of the fishes of Deer Lodge River, he wrote, "This valley is one of the most beautiful in the mountains, and it is famous for two things. One is that mountain trout are more plenty in it than in any other place of the same extent in the world. I do not know, however, but I had better say *were* more plenty, for vast quantities of them have been caught in the last year, a large portion of which were allowed to spoil and were thrown away. . . . The trout will bite at almost any kind of bait at any time of year, yet some 'barbarians' have used seines and dragged out these beautiful citizens of the brook by the wagon load. . . . If the legislature does not enact some laws in regard to game and fish, there will not be in a few years so much as a minnow or a deer left alive in all the territory."

Fortunately aid did come in time to prevent the extinctions he feared, but under the conditions of his era he was not over-pessimistic. In the United States, buffalos now exist almost solely in fenced reserves; mountain sheep and curlews have never regained their original abundance; and the trout are kept going only by restocking. Without such forthright warning voices, the record, doubtless, would have been worse.

Gally— A One-Man Bird

By GOLD V. SANDERS

Illustrated by Charles W. Schwartz

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". . . offered him water in a medicine dropper . . . he seized it in his beak and held on tight until he gobbled down all he wanted."

GALLY, the purple gallinule, was a one-man bird from the moment he exploded out of his egg-shell under my startled eyes. Some wild fowl instinct must have told him I was his mother. By rights he might have turned his great affection toward an electric light bulb, which really gave him birth. That was his incubator—nothing more nor less than a 15-watt bulb, placed near enough to give the egg what I guessed to be the right amount of warmth. It must have been a good guess, for on the fourth day I heard an undeniable sound from within the shell, and an hour or so later, out popped Gally.

I must admit I was startled to see that my crude incubator had worked this miracle. And I was equally startled to see what emerged. Having seen his brilliant purple and green mother when my fishing boat accidentally wrecked her nest, I probably was expecting a purple chick to come out of the egg I had salvaged. There was nothing beautiful and nothing purple about Gally, just a mess of legs, feet, neck and head; no body to speak of. My first impression was that the manhandling that egg had received, plus the novel means of incubation, had produced a monstrosity.

That is probably the way all newly-hatched gallinules look. After a while, when he dried out and glossy black down stood out on him, he did not look so bad. But what worried me then was that he could not stand up. He was lively enough and pulled himself all around with his sturdy little wings, dragging the rest of his anatomy. He looked just like a seal on dry land. But this queer looking creature was destined to become the most interesting pet I have had in my many years of taming wild things.

Of a sudden it occurred to me that now I had the responsibility of nurturing this exotic creature that my bright idea had brought into the world. What to feed him I did not have the least idea. But there are ways to learn such things. I rushed off to the public library to do some research on purple gallinules. The reference books told me these water fowl live on wild seeds and insect life. I could get seeds and such, but how to provide the insects? Presently another bright thought struck me—grasshoppers. There were plenty of them in a grass-covered vacant lot, which, fortunately for me, was just across the alley from my garage.

Soon I had a couple of nice, green, juicy hoppers for Gally. I chopped them into bits, mixed them with corn meal and approached Gally in his hatbox, wondering whether he knew how to eat, and if so, what he would think of this concoction. He did not stop to think, but grabbed some of it from between my fingers. He liked it fine, and was as happy as I was about the whole thing. I also offered him water in a medicine dropper, and he knew what to do about that, too. He seized it in his beak and held on tight while he gobbled down all he wanted.

The second day I was happy to see that Gally could stand up. Grasshoppers and corn meal were giving him strength and he achieved control of those immense legs and feet, to a degree. He waddled along with the most comical, side-to-side movement, and he started following me, right at my heels, stopping when I did, ambling along when I moved again. He ignored the rest of the family. It was plain to see he had adopted me, and I always believed it was because I was the first living thing he saw when he broke out of his shell. Who knows? Anyhow his attachment to me never wavered.

I went on catching grasshoppers and Gally grew and prospered. When he was not howling for food, it was for attention. He was not content merely to follow my every step, but wanted to be picked up and

"When he was four days old he managed to climb out of his box by leaping up and catching hold of the edge with his wings."

held in my hand, where he was perfectly happy. If I sat down, he would proceed deliberately and laboriously to inch his way up my trouser leg, using his stubby wings as if they were hands, and pushing himself up with his toes. He would keep climbing until he arrived under my chin, where he would settle down. If I lay down to take a nap, he would pace back and forth beside the bed, piping loudly at me with his queer voice, which had a bell-like tone to it. There was nothing to do but pick him up and cover him with my hand. Then he would go to sleep with a lot of contented little peeps. At night he slept in his hatbox with his electric bulb to keep him warm, but not without a lot of protest. When he was four days old he managed to climb out of his box by leaping up and catching hold of the edge with his wings.

There is a certain soul satisfaction in having for an affectionate pet a creature designed by Nature to spend its life in the wild. The gallinules are among the most timid and furtive of wild fowl, and spend their time well concealed in dense water growth away from shore and likewise away from open water. Few persons ever see them. There is a myth in the South to the effect that they are not hatched from eggs, but are blown in from the sea by hurricanes. This is probably because their nests are concealed in such inaccessible places that they are rarely seen.

I never ceased to wonder at the odd mixture of tameness and wildness in my gallinule pet. His furtive nature was ever apparent beneath the surface of domesticity. He would not cross an open space in a room unless he was at my feet. He preferred to sidle along the wall or under the furniture. When he was not near me he had all the timidity of his wild kin. He was always eager to come when I called him by name, but he would creep along under cover until he was quite near, then cross the last open space in a sort of panicky rush. He was mortally afraid of strangers. When I attempted to show him to friends he would dart out of the room and hide. One afternoon, when he was much older, I came into the living room with him standing on my shoulder to show him to my wife's bridge companions. When he saw all those strange faces he went wild, lost his balance, floundered onto the bridge table and scattered cards in all directions in his mad scramble to get out of there. I found him hidden under a bed. I was always aware that it would not take much to make Gally completely wild, although he had never known the wild.

". . . lost his balance, floundered onto the bridge table and scattered cards in all directions in his mad scramble to get out of there."

"He flew high up in a tree and glued himself to a limb. There he stayed, paying no heed to my calls, showing no sign that he even recognized me."

Meanwhile I went on catching grasshoppers, and, as Gally grew larger, I took him with me, hoping he might take a hint and start capturing them for himself. But nothing doing; he merely followed and waited. When I would slap my hand on a hopper he would come running to take it out of my fingers. He got so he knew when we were headed for the tall grass, and made his pleasure known by a series of chuckles that came from down deep in his throat.

Now a half-grown water fowl is not exactly an ideal house pet. The time came when my wife started issuing ultimatums about Gally and his manners. I pleaded for time because I had an idea I might be able to house-break him, in a way. I had noticed among Gally's many peculiarities an instinct of his for which I cannot account, but which I can best describe by saying that stepping into water always had an automatic effect on his intestines. My wife still likes to tell about my taking Gally to the bathroom and trying to get it through his head that there was always water in the commode. I still think my scheme might have worked out if she had given me and Gally more time for this educational process. But he was banished to the garage.

Gally gradually acquired a graceful figure and bearing. His black fuzz changed to black feathers and then to a beautiful, shimmering green, but still no purple. He was a great curiosity to the neighbors as he followed faithfully at my heels wherever I went. Some took him to be a frying-size chicken until they got nearer and saw his immense feet, his coral red bill and green plumage. He had long, business-like wings now and no longer used them for hands. One day I left him behind in some shrubbery when he was not looking and crossed the street before he missed me. Just as he discovered he was alone and began looking everywhere in alarm, an automobile passed between us. That taught him to fly, in a hurry. He flapped his way into the air about six feet and headed straight for me, landing right at my feet. Instantly he was calm again. Thereafter he always used his wings to get to me quickly when called.

Living in the garage, Gally saw less of me. He was overjoyed when he heard me coming and I would hear that joyful chuckle of his when I opened the door. Then he would jump to the top edge of his big wooden box and stand there flapping his wings vigorously as if to show how happy he was. This demonstration over, he would jump down and come to me, ready to go hunting his beloved grasshoppers, or to tag along wherever I went.

This happy companionship went on for five months. Then one day a dog rushed at Gally and almost caught him. He flew high up in a tree and glued himself to a limb. There he stayed, paying no heed to my calls, showing no sign that he even recognized me. He was just a purple gallinule again. I gave him time to calm down, but when it started growing dark and he still sat there, I got a long cane pole and tried to push him off. That was the last straw. He suddenly took off in headlong flight and the last I saw of him he was sailing over a two-story house a block away. All domesticity had gone out of him in that one terrifying encounter with a natural enemy; otherwise he would have come back home.

I like to think Gally found his way to Orange Lake and that he is happy there among the lily pads and bullrushes, in a wild setting where he belonged.

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Beavers

By PEARL JOAN COSGRAVE

I watched some engineers today
Construct a dam, and thought
"I'm *glad* it cost too much for me!"
That coat I almost bought.

The "Five Poisons"

By MABEL IRENE HUGGINS

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A thin paper cut-out pattern of the "five poisons" to be embroidered on the end of bed pillows as protection. Drawing by Margaret Whitfield.

SNAKE, toad, centipede, scorpion, spider—evil creatures that *can* be protective—this is the topsy-turvy paradox that we find in the "five poisons" of China.

In different regions of the country, there seem to exist slightly different ideas as to which kinds compose the noxious five. In some localities everyone agrees that the loathsome creatures are the snake, the toad, the centipede, the scorpion and the spider. In other places the people are just as sure that the lizard is one of the five, substituting it for the spider or for the scorpion. In every case—and this is of chief importance—there are five of these symbols of pestilence. The number never varies.

By a curious, and wholly unscientific, stretch of nomenclature, the *wu tu*, "five poisons," are sometimes called the "five poisonous insects." According to our rules, not even one of the group may be so classified. However, to the Chinese mind, all are crawling things, so in every one of their Chinese names was incorporated the symbol for *ch'ung*, meaning "insect."

Taken separately these diabolical "insects" are looked upon with fear. When they become old, they are believed to transform themselves into sprites. In this form they can cause a great deal of trouble by means of magic. They are believed to wreak their bad tempers upon those who have incurred their wrath, bringing many forms of malignant and painful disease. Chinese folklore abounds with tales of their calamitous deeds.

Because snakes are alleged to have supernatural powers, they are commonly venerated. It is thought that a snake that has been killed may plague with disease the child of the one who killed it. Perhaps such a belief is responsible for the deference that is often shown snakes. They are harbored not only in certain temples but also in small snake houses, which are sometimes erected especially for the purpose in back courtyards of people's residences.

There are many old legends that tell instances in which the victims of angry snake-demons have suffered misfortune, illness, and even death. One relates the hardships that came upon a villager because a snake bored its way through his nose and coiled itself inside his head, where it made unpleasant buzz-

An embroidered mirror case of the Ming period shows the noxious five in the design. Courtesy of William Rockhill Nelson Gallery of Art of Kansas City.

ing, crunching, and gnawing sounds. After a time it left him. However, it returned, but this time he quickly tied his handkerchief over his nose and mouth and prevented its entrance.

Snakes are believed to cause boils, ulcers and other skin ailments. These complaints may be treated with the smoke of a burning centipede, or with an ointment of hogs' lard and powdered centipedes.

Jade amulet with spider, snake, centipede, lizard and three-legged toad. Courtesy of the American Museum of Natural History.

The ordinary toad is loathed and despised as an ugly, useless creature quite capable of being a specter in disguise. The story is told of a toad-demon that hid itself in a great wen on the top of a man's head, but finally it was expelled, leaving a cup-like cavity where it had been. Another legend tells of a girl who became insane because of a toad-demon. According to the story, the toad was caught and simmered in oil, and then the girl recovered.

Among Chinese toads, the most famous is a three-legged specimen that can be seen pictured on the full moon. A well-known myth relates that Hou I, a legendary chieftain who lived about 2500 B.C., obtained the elixir of immortality from the Royal Mother of the Western Paradise. But Ch'ang O, his wife, stole it from him and then fled to the moon, where she was changed to a toad.

Another three-legged toad belonged to Liu Hai, a 10th-century minister of state who was well versed in Taoist magic. It acted as Liu Hai's steed and carried him wherever he wanted to go. Unfortunately it had a way of escaping and concealing itself down the nearest well, but Liu Hai always managed to catch it again on a line baited with golden coins. Pictures and small figurines of Liu Hai and his captive toad are quite common. Usually they represent him with one foot standing on the toad and with one hand holding a ribbon upon which some gold cash have been strung. People think that Liu Hai's toad, symbol of money-making, brings good fortune.

Properly speaking, a three-legged toad is not one of the "five poisons," although it is often found in representations of them. This is because in recent centuries craftsmen have ignorantly or carelessly substituted this form for his hated cousin.

The centipede is credited with exerting its venomous powers not only on man but also on the mythical dragon, which had a more important role than any other animal throughout the long centuries of the Celestial Empire, and even down through the recent decades of the Chinese Republic. It is a widespread belief that the centipede can go right through a person's skin and into his body. The favorite way of entering a dragon, however, is through its ears or nose. When once inside its skull, the centipede proceeds to eat the dragon's brains. Naturally, dragons have become extremely afraid of centipedes.

When a person tries to kill a centipede, a thorough job is necessary. Just cutting the creature in two will not suffice, for, according to current opinion, the parts can come together again.

Every traveler who goes to Peiping sees the beautiful temple known as the Temple of Heaven, more properly called the Hall of Annual Prayers. This building, famous for its three-tiered terrace of sculptured white marble and its three-tiered roof of blue glazed tile, is quite modern, for it was built after 1889 when the earlier structure, having been struck by lightning, burned. The disaster occurred, so the story goes, because a centipede presumed to climb upon the golden ball at the top of the temple, whereupon

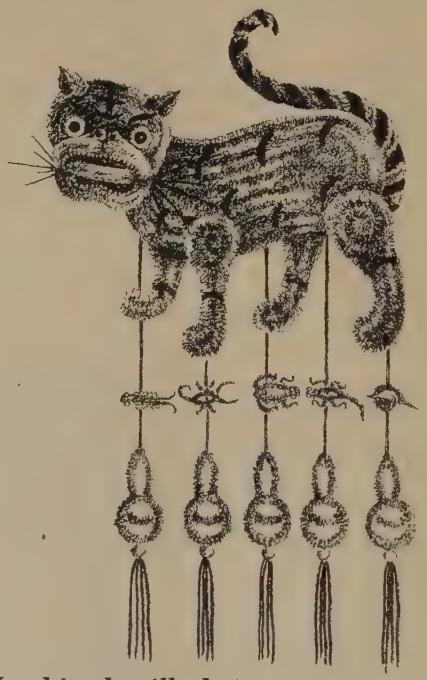
Embroidery showing a medicine goddess, the "five poisons" and some of the medicinal herbs associated with the *Tuan Yang* Festival. Courtesy of Frances Bieber.

This bed valance, executed in cross-stitch, includes the "five poisons" and a scene from the play called "The Butterfly Cup," the bridal boat occupying the place of importance. Courtesy of Carl Schuster.

a heaven-sent thunderbolt punished it for its arrogance.

From early spring to late autumn the people are on a constant alert for scorpions, those moisture-loving, crack-and-crevice dwellers that come out at night when folks are apt to be off guard. For some unknown reason, scorpions are thought to go singly on the odd days of the month but in pairs on the even days, so, beware! If one is killed on an even day, the mate should be sought, because, without fail, it will be lurking near. Although the sting of the scorpion is usually not fatal, it is something to be avoided on account of its intense painfulness.

Throughout the summer, lizards are plentiful in North China, where they hide by day but appear in the evening, a common haunt being the ceiling of a porch. There they stalk beetles and other insects, and, with arrow-like swiftness, dart after their prey. The secretions of lizards are considered deadly to man. In Shansi the people are terrified at the mere sight of a lizard and say that it is full of poison. As the centipede is supposed to crawl into the ear of a dragon and suck out its brains, so the lizard is believed to enter the ear of a sleeping person for a similar purpose.



In this chenille hair ornament the noxious five are suspended from the tiger. By Margaret Whitfield.

In North China where lizards are feared and included in the "five poisons," people seem indifferent to spiders, but in other regions more attention is paid to them. In some places people think spiders are the cause of nightmares. Spider-demons are also credited with appearing in the form of charming women who bewitch men with their wiles.

When the "five poisons" are taken collectively, they present a different picture. Joined together, they are regarded as a powerful combination for counteracting the assaults of baneful influences. Instead of producing pain, they ward it off. Instead of bringing evil, they give protection from it. Instead of inflicting disease, they guard against it.

For centuries one of the important days on the Chinese calendar has been the *Tuan Yang* Festival, which occurs on the fifth day of the fifth lunar month. Part of its observance has consisted in the exorcism of disease-bringing specters, which are wont, according to popular belief, to cause illness during the season of greatest heat. At that time various medicinal herbs and charms are used, and here the "five poisons" come into play.

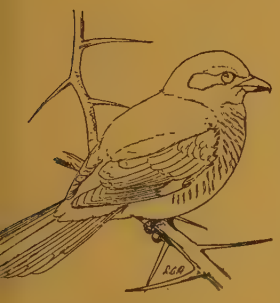
Red or yellow paper charms are among the kinds most frequently employed. On them there may be pictures of the five creatures, together with Chang Tao-ling, one of the famous Taoist exorcists, who is often shown seated on a tiger. Sometimes these paper charms are dexterously fashioned cut-outs with likenesses of the "five poisons." Such charms do not always show all five but may be limited to the scorpion or the centipede with a pair of scissors, suggesting in a realistic manner one method of disposing of these two "insects." The usual place to paste these paper charms is above doorways. Their use is not confined to the *Tuan Yang* Festival, for in some places they are also put up on Chinese New Year's day, the purpose at both times being identical—the hope of preventing disease or misfortune.

The "five poisons," with their specter-dispelling function, are also used in ways that are meant to give children special defense from evil spirits. Embroidered on aprons or pockets, (Continued on page 552)

HAIRY WOODPECKER

DOWNY WOODPECKER

PRAIRIE HORNED LARK



NORTHERN SHRIKE

This is the thirty-second in Nature Magazine's series of educational inserts.

Some Eastern Birds in Winter

By E. LAURENCE PALMER

Illustrated by Louis Agassiz Fuertes

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ON THE bitter mid-December day when this article was started, my thirteen-year-old son came dashing into our home in central New York with the news that he had just seen a Canadian warbler. Somehow, this did not make sense, but I knew the boy and the bird and I immediately investigated. Sure enough, there in our snow-covered back yard, not ten feet from where I stood, I had the chance to watch this emblem of the warmer seasons busily trying to get a meal from around the buds of a defoliated honeysuckle bush. For two days, the bird was seen about our home. Then it vanished at about the same time that a blizzard took over our neighborhood as a playground.

This article might deal with such unusual records of birds seen in the East in winter. Or it might deal with the common ideas about these common birds, a subject treated many times. Or we might see what inspiration we may draw, what philosophy we may develop, from friendship with the birds and from watching them go about their business in winter.

We shiver in our steam-heated homes or between the covers of a well-prepared bed. Yet, when we jump out in the morning to close the window, we look out where it is *really* cold. There, we may see flocks of tree sparrows or juncos gayly going about their business of eating the seeds from the weeds we left at the edge of the garden last summer. Unconsciously, we are forced to admit that somehow they have something we do not have. This magnifies our respect for them, and reduces our conceit about ourselves. Such a reaction should do us good.

Bungay says of one of these snow sprites:

"Blithe wanderer of the wintry air,
Now here, now there, now everywhere,
Quick drifting to and fro,
A cheerful life devoid of care,
A shadow on the snow."

Yet we worry about income taxes, old age security, politics, the war, and bank balances. True, a generous proportion of our population is being trained to let tomorrow's troubles take care of themselves, and those of us who must pay their bills are left to carry the burden. We might look at these winter birds from this angle, and draw a philosophy for ourselves from their seeming lack of responsibility. We might even give full rein to our religious instinct, shift all responsibility from ourselves and find in the situation an opportunity for study of the ways of the Deity. As one second grade child put it:—

WHITE-BREASTED NUTHATCH

CHICKADEE

BROWN CREEPER

"Oh Goldfinch. Oh happy wren
Who gave you all those pretty feathers
Who gave you fur to stuff your breasts with?
'Twas God. 'Twas God that done it."

But in this article we do not propose to dwell on a philosophical or on a religious interpretation of what we see our bird neighbors doing in the winter in the East. Instead, we propose to take a more realistic viewpoint; consider what and where they are, how they survive, and what good they may be to us and in the general panorama of Nature, of which they and we are a significant part.

It was a difficult task to select eighteen birds for inclusion in the chart section of this article. Fortunately, we need not include the game birds that are with us in winter because they have already been covered in the ninth unit on "Upland Game Birds and Waterfowl." Neither was it necessary to deal with the birds of prey, since eighteen of them were discussed in the nineteenth unit, "Let's Pray for the Preying Birds." If, to these thirty-six birds, most of which may be seen in the East in winter, we add eighteen other birds, we will have a fair cross-section of the winter bird population to be found in most parts of the East. While a serious bird census in winter in the East would probably list around a hundred species—forty-seven were seen in Ithaca on January 1, 1944—those most commonly and widely found would no doubt be included in the fifty or more now covered by this series of article. Excluded, chiefly because of lack of space, would be such common tree-top birds as the cedar waxwing, evening grosbeak, tufted titmouse, goldfinch and purple finch and the late-season robins and blackbirds. Also we pass over such weed-patch feeders as the white-throated sparrow, and such brush-pile residents as the surprisingly loud-mouthed but diminutive winter wren. Thus another article on birds of this classification could be easily prepared. To the amateur naturalist who may think of winter as devoid of birds, this should suggest that the season holds much of interest to the bird lover who is not afraid of a few chilled fingers, or who is willing to make some intelligent effort to entice the birds to a window feeding station.

Anyone who starts to make his own winter bird census, and to record his findings in a diary, will become impressed with the fact that winter birds seem to favor rather particular types of habitat. You need not look for a winter wren where you find a flock of snow buntings, for example. What are some of the conspicuous units of habitat in the winter season?

I like to think that the typical bird of the winter is the one that can survive in the open,

ENGLISH SPARROW

GOLDEN-CROWNED KINGLET

CARDINAL

SONG SPARROW

TREE SPARROW

on the snow, where the only signs of a more kindly climate are provided by the dead tops of last summer's weeds. It may be all very well for a robin or so to lurk in some sheltered nook, but it takes the highest avian character to survive on a wind-swept hilltop, and the birds who can "take it" there win my vote of approval. Among these birds, of course, the most conspicuous are the juncos, tree sparrows, horned larks, red-polls and snow buntings. Almost any weed patch will show the tracks of one or more of these birds whenever there is good tracking snow. Or the birds themselves may be seen, usually in flocks, busily pulling down weed tops for the food to be found there. Mixed in with these, of course, may be a considerable miscellaneous group of sparrows. In such company, you will not find the woodpeckers, chickadees or brown creepers.

A city teacher who came to summer school once asked me what the birds did at night in the summer when it rained and when they were not near a barn where they could get shelter. If she thought the birds could not survive a warm summer shower, I cannot help but wonder what she thought they would do on a bitter, winter's night. I am writing this paragraph immediately after having returned from a winter trip in my own little woodlot. In a twenty-minute jaunt, I spotted chickadees, downy woodpeckers, a brown creeper, two kinds of nuthatches and a large flock of crows. The crows were evidently disturbed about something near a dead stub, under which I have repeatedly found the pellets regurgitated by great horned owls. By the time I reached the area of the excitement, the crows and the cause had departed. I found the tracks of pheasants and grouse, so know that the birds must have been in the area since the snow fell the day before. True, in the summer I can see and hear many times the number of species just seen on this winter's trip, but I doubt if I can see many of the birds so well then as I can now. I took this trip because I heard a cardinal call at the edge of the woods, but I did not see him when I reached the spot where he must have been. That is one thing about outdoor bird study that is not true of indoor work—you cannot count on everything being in its place just when you want it. This naturally adds to the interest.

I could follow this listing of places and birds indefinitely, but I doubt that this is necessary. I do like to think of particular places as being the home of particular kinds of birds, however, since it gives me added satisfaction when I find that they are where they belong. I could be distressed, if I were not disturbed, by finding a nuthatch in a weed patch, just as

would decide that I might be getting old ad I not been excited when my son told me n December that he had just seen a Cana- ian warbler in our back yard.

I believe I could take you, in total dark- ess, to a place in my woods where we ould have a good chance to disturb a reech owl. I have done it with classes in he summer. Now, in winter, the owl would ot make his presence known. But within month or two we will begin to hear him t night, and probably a little later his fam- y will start their nesting. This will be be- ore some of my neighbors even begin to ink about spring.

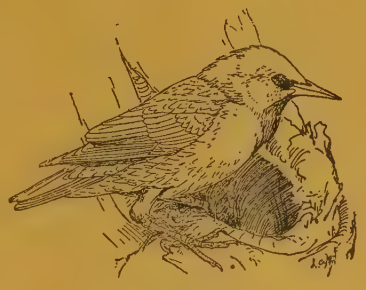
Just as there are place studies that may be ade of birds in winter, so there are inter- sting time studies that may be made. By hristmas, the crows of my neighborhood ill have begun their daily carousal in my oods. As the season progresses, this will ecome noisier and noisier. Some neighbor ill call me up to see if he cannot get per- ission to go up and shoot a few. So far no ne has been given permission to do this. t first, this jabberfest of the crows will be or a short period in late afternoon, but, as e winter wears away, the time may be ex- nded until finally they may be heard at al- ost any of the daylight hours, up until the me they split into family groups and are uch more secretive about their activities. omehow, I cannot get away from drawing comparison between the bashful "first ate" stage, the blatant "jitter-bug" state, nd the comfortable "middle age" stage rough which we, over a period of years, ass ourselves.

But crows are not the only audible bird lendar available for us in winter. About e time the crows are "hitting on high," oodpeckers will begin drumming and call- g, chickadees will be giving their "phoebe" ll, and nuthatches will be patriotically call- g for the Yanks. In the fields, as the sea- n advances, there will be a more or less derly sequence of sounds, starting with a w chirps of the English sparrows, and ing on through the cheerful twitter of tree arrows to the musical chipping of juncos. the tree-tops around our houses and rns, early January will find starlings giving variety of calls that, to the uninitiated, will ad to the suspicions that a number of dif- rent kinds of birds have arrived unex- ctedly. In the brushlands, by late winter, e song sparrows will begin trying out their ngs at about the time the horned larks ve staked out their territory in the fields.

BLUEJAY

SNOW BUNTING

REDPOLL



STARLING

JUNCO

When this happens, you can begin to get out your bird song records and play them over on the phonograph so as not to miss identifying the new arrivals as they come. When the fox sparrows show up in our neighborhood, I am reasonably sure that spring is here as an established fact.

There are a few things about winter birds that I like to study each year. These do not relate to their songs or their general appearance. The morning I wrote this the snow on our back steps was marked with pairs of little arrow-shaped foot marks. I know that they were made by sparrows, probably English sparrows, feeding on the crumbs dropped from a nearby feeding station. But when I am away from the house and going through the fields, I watch not just for tracks, but for particular kinds of bird tracks. The paired tracks of many kinds of sparrows, showing the marks of the long hind claws of the perching birds, are always common. Less common but frequently abundant are the alternating tracks made by walking, or running, horned larks. These, too, show exceptionally long hind toe-marks. Larger than any of these, and with the two inner toes conspicuously close together, are the crow tracks. They are always worth following and interpreting because they usually lead to something interesting. This interesting story may be read in the snow hours after the bird has flown. Lacking the long hind-toe marks of the birds so far mentioned, are the tracks of such scratching birds as quail and pheasants that most outdoors folk know. The larger size of the pheasant's track easily distinguishes it from the track of the quail. In my neighborhood, a quail track is now sufficiently rare to be a cause of celebration when it is found.

Besides merely looking for bird tracks for the purpose of identification, I get no little satisfaction from keeping mental and other notes about the particular places where they are most abundant. Food and cover seem to be important in this connection. If there is food and shelter, the tracks will be abundant. If there is neither, there is likelihood that the tracks will be few. Here is the essential basis of our whole philosophy of wildlife management demonstrated again and again on almost every snowbank or snow-covered area in the winter.

If we must look at our birds from the standpoint of their economic importance, and are thoroughly honest, we may be compelled to make some adjustments regarding the generaliza- (Continued on page 536)

COMMON NAME SCIENTIFIC NAME	HAIRY WOODPECKER *Dryobates villosus*	DOWNY WOODPECKER *Dryobates pubescens*	PRAIRIE HORNED LARK *Otocoris alpestris*	CROW *Corvus brachyrhynchos*
DESCRIPTION	Length: to 10.5 inches; wing-spread, to 17.5 inches; tail, to 4 inches; bill, to 1.36 inches. Weight: to 3 ounces. Temperature: 105°F. Female: smaller, and lacks red on back of head. Outer tail-feathers, white, without black bars or markings. Works on trunks and branches of trees, head uppermost. Orchard, copse and woodland species.	Length: to 7.15 inches; wing-spread 12.25 inches; bill, .8 inch. Weight; 1.5 ounce. Black and white streaked, with white, outer tail feathers, barred faintly or marked with black spots. Male: with red spot on back of head; this spot lacking in the female. Southern downy, browner on the underparts than the northern. Temperature: 108° F.	Length: to 7.4 inches; wing-spread, to 13.25 inches; tail, to 2.6 inches. Arctic horned lark, slightly larger and with yellow line over eyes instead of white line of prairie horned lark. Appears considerably smaller than robin, and with contrasting, light-colored body, and black tail; walks, rather than hops. Tends to form flocks.	Length: to 21 inches; wing-spread, to 29.7 inches; tail, to 8 inches; bill, to 2.6 inches. Weight: about 20 ounces, variable. Female: averages smaller than male. Color: all black. Lacks separated, long-pointed, throat feathers of raven; is smaller, and with squarer tail. Young: only slightly duller than adults.
RELATIONSHIPS AND RANGE	Subspecies, 13, including, in their resident range, territory from Alaska to Newfoundland within the tree zone and south into northern Mexico and through Florida. Included are the Northern, the Eastern, the Southern, the Rocky Mountain, the Lower California, the Sitka, and the Newfoundland hairy woodpeckers.	Mostly resident. Six subspecies include the northern and the southern, which range from southern Alaska to Newfoundland within the tree belt and south to California, Arizona and the Gulf States. Northern, is rarely south of Nebraska and Virginia. Rarely above 3,000 feet altitude. Tree species.	Prairie horned lark: breeds, from southern Manitoba to central Quebec, and south to Missouri and Maryland. Winters: south to Texas and rarely to Florida. Related subspecies: 16, extend range over most of United States, Canada and Alaska, and northern Mexico; subspecific differences of minor importance. In California Pleistocene. Open field species.	Five subspecies include the Eastern, Southern, Florida, Western and Northwestern crows: all with minor differences. Eastern race breeds from southwestern Mackenzie to Newfoundland and south to Maryland and northern Texas. Winters, between north and south boundaries of United States generally. From Pleistocene of Florida and California.
LIFE HISTORY	Nests: in woods and orchards. Nest hole: constructed in a dead branch or tree trunk, or may occupy a bird box. Entrance: 2 inches; depth, to 16 inches; from 5 to 60 feet above the ground. Eggs: 3 to 5, shining white, 1.02 by .75 inches. Incubation: 14 days, by both parents. One annual brood. Young: like adults. Nests rather early.	Nests: in orchards, mixed forests and in street trees. Hole: in a tree, bird house, or even grape trellis. Entrance: 1.25 inches; depth, to 10 inches. Eggs: 4 to (rarely) 8, white, .75 by .62 inches. Incubation: about 12 days, by both sexes. Young: reared by both sexes. One annual brood. Constructs in Autumn a new tree hole for winter.	Builds nest on ground, may be near edge of snow bank. Nest: of grass, lined with soft stuffs. Eggs: 3 to 5, light drab or grayish, and uniformly spotted with brown of different shades, .96 by .66 inches. Incubation: from 11 to 14 days, by both sexes, but chiefly by female. Annual broods: 2, 3, or even 4 on rare occasions in south.	Nest: a platform of sticks, in top of tree, or on branch close to trunk, rarely in bush, where there are no trees: lined with finer plant materials. Eggs: 3 to 9, pale, blue-green to olive, with gray or brown blotches or markings, 2.06 by 1.4 inches; egg-weight, .62 ounces. Incubation: 15 to 18 days, probably by both sexes. Annual broods: 1 or 2.
FOOD	Food: insects gleaned from bark, or dug from dead wood. Most destructive of hairy caterpillars and of their chrysalides, including pestiferous gypsy moth, within its range. Also eats ants, grasshoppers, spiders and wood-boring beetles. Estimated 77.7% animal-matter food, the remainder vegetal, including nuts and seeds.	Food: examination of stomachs of 723 birds showed 76% animal matter, and remainder, vegetal. Animal matter, mostly insects that are plant pests. Vegetable matter included some sap and cambium of trees, and seeds of plants. Food: gleaned from trunks and limbs of trees or dug from the wood.	Food: in agricultural regions largely waste grain, weed seeds, and insects, particularly cutworms that may be exposed by plowing and cultivation activities. It is especially beneficial as a destroyer of weed seeds; follows farmers in the fields getting insects and weeds as soon as they are turned to surface. Flight speed: 54 miles per hour.	Food: enormous quantities of insects, carrion, weed seeds, as well as eggs and young of other birds, including some game birds; also grain waste, mice, ground squirrel, rabbits. When grasshoppers are abundant, average crow stomach contains about 100. In farming regions, 38% of food may be corn. Known to kill newborn lambs.
ECONOMIC IMPORTANCE	Practically entirely useful and most valuable about orchards. Good orchard practice calls for the erection of nest sites or the protection of existing sites. Individual range: a few acres, if food and nesting sites are available in sufficient abundance.	Undoubtedly useful. While it may eat some of the growing layer of trees and drink sap, the injury in these activities is minor and is scattered rather than concentrated in one area, as with the sapsuckers. The birds are easily attracted to feeding stations by suet and become unusually popular window visitors.	Essentially, a useful species. May do some damage to winter wheat if it is not covered properly, or if it does not become established promptly, but this damage is more than paid for by the good done. It is worthy of protection at all times, apparently.	Unbiased students contend that while crows do much damage, on average they do more good than harm. Serves as buffer animal which may be shot to relief of more valuable species. Numbers do not decrease much by organized shooting as birds tend to get more wary. Have great winter roosts for flocks. Flight-speed, 60 miles per hour.

BLUE JAY *Cyanocitta cristata*	BLACK-CAPPED CHICKADEE *Penthestes atricapillus*	WHITE-BREASTED NUTHATCH *Sitta carolinensis*	BROWN CREEPER *Certhia familiaris*	GOLDEN-CROWNED KINGLET *Regulus satrapa*
Length: to 12.5 inches; wing-spread, to 17.5 inches; tail, to 6 inches; bill to 1.25 inches. Weight: to 3 ounces. Female: smaller than male. Colored, conspicuously blue, white and black, with long, round-tipped tail, conspicuous head crest. "Sassy" in disposition, and noisy unless it considers it good policy to be otherwise.	Length: to 5.75 inches; wing-spread, 8.5 inches; tail, 2.7 inches. Entire crown, throat and hind neck: black, without a crest; in Hudsonian chickadee, brown. Outer margins of wing coverts, whitish; (in Carolina chickadee, not white). Sexes: colored alike. Young: like adults in general appearance. One or two annual broods.	Length: 6.15 inches; wing-spread, 11.5 inches; tail, 2.25 inches; bill, .86 inches. Female: smaller than male. Breast: white. back: blue-gray. Cap: black. Goes up and down tree trunks, with head up or down, with equal ease. Female: slightly duller on top of head than male, but otherwise much like male. Young: only slightly different.	Length: to 5.75 inches; wing-spread, to 8 inches; tail, to 3 inches; bill, .69 inches. Streaked, dark brown above, and gray beneath. Tail feathers: stiff and used as props when working on tree-trunk. Work on tree-trunk from the base up. Sexes: colored alike. Young: possibly not so dark as the adults.	Length: to 4.2 inches. Wing-spread: to 7 inches. General color: olive-gray, with a white stripe over the eye. Male: with conspicuous, orange crown. Female: with conspicuous yellow crown. Young: like the adults, the first winter, but in juvenal plumage lack the colored crowns and have plumage that appears loose and fluffy.
Three subspecies include: the Northern, the Florida and the Semple's. Northern: breeds from southern Alberta to Newfoundland, south to Colorado, central Texas and Virginia; other races to south. Northern race migratory to some extent. It ranges somewhat farther south in winter, but is resident throughout year over most of range.	Four subspecies include: the black-capped, the long-tailed, the Oregon, the Yukon; 17 other subspecies in 6 other, closely-related species. Black-capped, ranges from northern Ontario to Newfoundland, and south to Missouri and North Carolina, intergrading with long-tailed, which ranges westward. Tree species.	Seven subspecies include; white-breasted, Florida, Rocky Mountain, slender-billed, Inyo, San Pedro and San Lucas nuthatches. White-breasted: ranges from southern Manitoba to southern Quebec, south to northern Texas and South Carolina. Defends home territory; 25 to 48 acres. About trees in woods, parks or streets.	Breeds: from central Manitoba to southern Quebec, south to eastern Nebraska and North Carolina. Winters: over most of breeding range, south to central Texas, southern Alabama, and southern Florida. Rocky Mountain creeper, a subspecies, extends range to Alaska, south into Mexico, breeding south to New Mexico.	Breeds: central Alberta to southern Quebec and Cape Breton Island, south to Minnesota and New York and in the mountains to North Carolina, with western subspecies ranging from Kenai Peninsula in Alaska to California. Winters: Iowa to New Brunswick and south to Fla. and Mex. Western: B. C. to Guatemala.
Nests: in dense woods or small groves; usually in coniferous trees. Nest: in crotch or branch close to trunk; 5 to 50 feet above ground; of sticks; with lining of roots, bark and leaves. Eggs: 3 to 6, greenish gray, or olive, with brown blotches, 1.2 by .9 inches. Incubation: 15 to 17 days, by both sexes. Annual broods: 1 or 2.	Nests: in forests, open woodlands, parks or orchards, in hollow, stub, or tree, almost always dug by the parents (sometimes in a bird box), from 1 to 50 feet above the ground, with 1-inch entrance, and to 12-inch depth. Eggs: 5 to 13, white, spotted with brown. Incubation: by both sexes, 11 to 13 days. Annual broods: 1 to 2.	Nest: usually, in a cavity, such as abandoned woodpecker's hole, or a bird house, from 2 to 60 feet above ground, lined with fine stuffs. Eggs: 5 to 10, white or pinkish, with brown or lavender spots, especially at larger end, .83 by .63 inches. Incubation: by female, 13 days. One annual brood.	Nests: usually in remote woodlands, under loose piece of bark or in old hole. Nest: of thin plant materials, hair and cobwebs. Eggs: 5 to 9, white to gray, sparingly spotted with reddish-brown, or purple-brown, .64 by .5 inches. Incubation: about 15 days, by female. Annual broods: 1 to 2. Nests in woods or near homes.	Nests: in evergreen forests. Nest: 4 to 50 feet up in evergreen, globular, with small opening at top, of leaves, moss, lichens, bark, feather-lined. Eggs: 8 to 10; .57 by .45 inches; creamy white, with brown and lavender spots. Incubation: not known, but probably 12 to 13 days, probably by female. One annual brood.
Food: as indicated by examination of 300 stomachs, shows bird is much more beneficial than injurious. Stomach contents of 292 showed: 75%, vegetal; remainder, animal matter, including 14% discarded shells of hen's eggs. Most animal matter was insects, spiders, snails and even fishes, frogs, salamanders, birds' eggs.	Food: largely insects and insect eggs. Stomachs of 289 yielded 68%, animal food, and remainder vegetal. Stomach of one had 450 eggs of plant lice in it; in fact, plant lice seem a favored food. Also included in food are bark beetles, weevils, scale insects, spiders, flies, wasps, ants, and similar creatures.	Food: in winter, 25% animal matter; in spring, 80%. One bird's stomach had 1629 canker-worm eggs in it. Kinds of insects eaten are of injurious and of beneficial kinds so the bird is probably neutral in importance to man. In orchards, does much good during seasons when caterpillars are active.	Food: insects and insect eggs gleaned from the trunks and branches of trees. In home life, female builds nest and does incubation, but male assists in bringing food to young. Food includes ants, plant lice, leaf-hoppers, codlin moths, caterpillars, spiders, pine seeds and suet from feeding stations.	Most active little birds, with surprising ability to withstand severe winter weather. Extremely shy about nesting, and will leave a nest that has been partly built if it seems to have been discovered. Food: in summer, caught on wing, but in winter, gleaned from twigs and trunks, and consisting entirely of insects, apparently.
As indicated above, is probably more useful than injurious. Certainly, it is a bird that provides all observers with plenty of excitement whether one attempts to locate a nest, to interpret its notes, to follow activities, or to determine statistically economic importance by soliciting opinions of humans.	Obviously highly beneficial. Defends home territory 100 yards across. Not estimated is number of people made happy by cheery visits these birds pay to window feeding stations or to popular woodland paths. State Bird of Maine. Song pitch: 3072 to 3700 cycles per second.	Apparently, liked even by those who do not know its name judging from great number of popular names it has—names such as "up-side-down-bird" and "Twirl-around-a-twig" describe its antics. One of the standard visitants to window feeding stations. Therefore beloved by those who must stay indoors.	Activities almost entirely valuable to man's interests and therefore deserving of every protection. More abundant than most people appreciate because it is not easily seen unless one is alert for such birds. Its fine call is a good test for hearing, as some cannot hear it at all.	Economic importance great, since they destroy great numbers of insects as adults, pupae or eggs, and glean these from delicate parts of the trees that could not be visited successfully by larger, heavier birds. Intensely interesting to bird-lovers because of their activity. Calls a high, repeated *see.*

COMMON NAME SCIENTIFIC NAME	NORTHERN SHRIKE *Lanius borealis*	STARLING *Sturnus vulgaris*	ENGLISH SPARROW *Passer domesticus*	CARDINAL *Richmondena cardinalis*
DESCRIPTION	Length: to 10.75 inches. Wing-spread: to 16.6 inches. Female: smaller than the male. Larger than the loggerhead shrike, with a finely-barred breast; with a flesh-colored, rather than black, lower bill, and without the loggerhead's narrow, black stripe above the bill. Young: browner than the adults, breast barred.	Length: to 8.5 inches; wing-spread, to 15.5; tail, to 2.9 inches; bill, to 1. inch. Weight: to 3.5 ounces. Temperature: 109.2° F. Female: slightly smaller than male. Like a short-tailed blackbird which flies in a varying-shaped flock. Bill: dark in fall, turning to yellow in spring. Blackish, with a gloss, flecked buff and white.	Length: to 6.35 inches; wing-spread, to 9.92 inches; tail, to 2.5 inches. Weight: averages 1.05 ounces. Temperature: 107° to 109° F. Male: needs no description. Female: easily confused with other sparrows; chiefly, olive-brown, with chestnut-streaked back. Bill: of adult male, black; of winter and young male, and female, brown.	Length: to 9.25 inches; wing-spread, to 12 inches; tail, to 4.75 inches. Weight: male, 2 ounces. Female: smaller than male. Male: scarlet except for black around bill; with a conspicuous crest. Female: yellowish-brown, with some red, but with the big crest and heavy red bill like that of the male.
RELATIONSHIP AND RANGE	Breeds: from northern Ungava to southern Ontario and Quebec, west to Hudson Bay. Winters: south to Kentucky, Virginia and North Carolina, with the northwestern going on to northern California, New Mexico and Texas. The winter shrike of the East. Northwestern shrike to Alaska and south to northern B. C., Alta., Sask.	Ranges, from New Brunswick to western Ontario, and south through Florida and Texas and still spreading westward. Native bird found in Europe and in Asia. Relatively closely related to the mynah, so common in Hawaii and in southern Asia. Introductions attempted from 1872 (Cincinnati), successful N. Y. in 1891.	Ranges and breeds throughout Europe and the British Isles, except in Italy and on east to Siberia. Introduced into America at Brooklyn, in 1850, and later at Quebec and Halifax. Now firmly established wherever man lives in numbers, north to about 55° in central Canada. Allied races in southern Asia, Asia Minor and in Africa.	Six subspecies; the eastern, the Florida, the Louisiana, the gray-tailed, the Arizona and the San Lucas. Eastern race resident at low and medium altitudes from southeastern South Dakota to southern Ontario, and south to the Gulf States. Occasionally also in New Brunswick, Massachusetts, Connecticut, Michigan, Colorado, elsewhere.
LIFE HISTORY	Nests: in northern forests; on a limb or fork of a bush or tree, 20 to 50 feet up, large, compact, of twigs and leaves, with fur, feather and lichen lining. Eggs: 4 to 7; 1.1 by .8 inches; white or bluish or grayish green, with green, brown, purple or gray markings. Incubation: probably 15 days, one, or possibly two, broods.	Nest: a large, bulky structure built of straw, grass, twigs, and lined with feathers and other soft stuffs; placed in a bird house, cavity in a tree, under the eaves of a house or in the top of a tree. Eggs: 5 to 8, pale blue or whitish, and glossy, 1.2 by .9 inches. Incubation: 11 to 14 days, by both sexes. Annual broods: 1 to 3.	Promiscuous. Nest: a clumsy, bulky mass of grass, trash and feathers, tucked into a bird house, under a roof, in a woodpecker hole or on branch of a tree. Eggs: 4 to 9, grayish, spotted with reddish-brown or dark brown and gray, .9 by .62 inches. Incubation: chiefly by female, 13 to 14 days. Annual broods: 3 or more.	Nests: in thickets or small trees. Nest: of twigs, leaves and grasses, rather loosely put together, and with a lining of finer grasses or hair; 3 to 30 feet above ground. Eggs: 3 or 4, variable, white, or greenish or bluish, marked with brown or lilac. Incubation: for 12 days, by female. Nests early. Annual broods: 1, 2 or 3.
FOOD	Perches, high, alone on a tree-top from which it drops low, then flies directly and rises abruptly at end to the new perch. Flight is easy. Food: mostly small birds caught on the wing, also mice and shrews, darting with incredible skill through brush tangles. Has been known to try to capture caged canaries behind windows.	Food: highly variable. Stomachs of 2157 birds showed: 57% by weight animal matter, including many injurious insects. Plants include grain, cherries, strawberries and similar fruits. Claimed that less than 6% of total yearly diet is cultivated plant products. usurps more useful bluebirds, woodpeckers and their kind, from nests.	Food: garbage, manure, insects, grain, fruits, young garden plants and almost anything possibly edible. Quarrelsome, crowding out more useful species, particularly from desirable nesting sites. Act in unison to eliminate rival individuals or species. Known to carry some diseases. Extremely hardy under all circumstances.	Food: varied, 36%, weed and other seeds; 24%, wild fruit; 9%, grain, 2%, miscellaneous plants. Animal matter, 29%, including Colorado potato beetles, cicadas, cottonworms, cutworms, codlin moths, leaf-hoppers, cottonboll weevils, cucumber beetles, plant lice and ants. Call: a loud cheery whistle.
ECONOMIC IMPORTANCE	Considered useful as mouse destroyer, and, in the West, is effective in destroying ground squirrels, which it kills with a sudden blow on the back of the head, according to John Muir. It is protected by law. Its bird-killing is done mostly in winter when other small animals are not so easily available.	Probably, carefully analyzed, starlings might be considered useful, but they are pests about public buildings in cities, in orchard regions and in grain fields. Better if they had never been introduced into America. Have replaced by competition for food and nesting places, so many native, beloved species.	One of few birds that is harmful, if any species is, yet one of the commonest and least bothered. Men try to destroy useful hawks and owls, but leave unharmed at their homes more destructive English sparrows. Numbers decreasing somewhat. Flight speed: 17 miles per hour. Hearing range: 675 to 11,500 cycles per second.	Estimated that it does 15 times as much good as it does damage. Formerly sold as cage birds at $10 per bird but this business is now outlawed, and the bird is protected by law, as it should be. Range has extended northward in recent years. Family life of cardinals worth watching. State bird of Ky., Ill., Ind., N. C., Ohio.

REDPOLL *Acanthis linaria*	SLATE-COLORED JUNCO *Junco hyemalis*	TREE SPARROW *Spizella arborea*	SONG SPARROW *Melospiza melodia*	SNOW BUNTING *Plectophenax nivalis*
Length: to 5.5 inches; wing - spread, to 8.8 inches; tail, to 2.7 inches. Female: smaller than male. Like small, brown sparrows, with bright red caps, and black chins. General appearance: finely streaked or spotted. Male: pink breasted. Flight: somewhat like that of the goldfinch.	Length: to 6.5 inches; wing-spread, to 10 inches; tail, to 2.71 inches. Weight: .7 ounce. Female: smaller than male. Dark, slate-gray above and across throat, but light gray beneath. Two outer pairs of tail feathers, white, flashing in flight. Female: duller with second pair of outer tail feathers grayer. Bills: bone-colored.	Length: to 6.5 inches; wing - spread, to 9.75 inches; tail, to 2.9 inches. Weight: to 1 ounce. Female: smaller than male. A brownish sparrow with a conspicuous round black spot in the middle of a gray breast and a conspicuous, red - brown cap and two, conspicuous, white wing-bars. Sexes: colored alike. Young: with top of head brown.	Length: 6.8 inches; wing-spread, 9.25 inches; tail 3.02 inches. Weight: .88 ounce. Female: smaller than male. A brown sparrow with a large central, black spot on the breast, a rounded tail, which it pumps up and down vigorously, and habit of singing from a high perch in defense of its home territory.	Length: to 7.35 inches; wing-spread, to 13 inches; tail, to 3.15 inches. Female: smaller than male. Colors: largely white, showing particularly when in flight. In breeding, the male mostly white, but when seen in winter in the United States, it is browner particularly on top of the head. However, no other small bird so white.
Three subspecies include: the common, the Holboell's and the greater redpolls. Common redpoll, breeds from Alaska to Gulf of St. Lawrence, south to northern Alberta and northern Quebec; also, into northern Europe and Asia. Winters: in northern United States, south to northeastern California. Field and brush species.	Two subspecies; the slate - colored, and the Carolina juncos. Seven other American species. Slate - colored: breeds from northwestern Alaska to central Quebec and south to southern Alaska, central Michigan, New York and Pennsylvania. Carolina junco, south in Alleghanies to Georgia. Winters: eastern U. S., southern Ontario to Gulf.	Two subspecies: the eastern, the western tree sparrows. Eastern: breeds, central Mackenzie to Newfoundland, south to northern Mackenzie, southern Ontario, southern Quebec and Nova Scotia. Winters: southern Minnesota to southern Ontario and south to Oklahoma and rarely to Georgia. Western: B. C. to Cal. Field species.	Subspecies: 26, including: the eastern, the Mississippi, the mountain, the Dakota, the Aleutian, the desert, and the San Diego, which locate themselves. Eastern: breeds from Mackenzie to Cape Breton Island and south to Missouri and Virginia. Winters: Michigan to New Brunswick, to Texas and Florida. Brushy land species.	Two subspecies include the eastern and the Pribilof snow buntings. Eastern: breeds from northernmost mainland of Alaska to Greenland, south to northern Quebec; also in Scotland and Scandinavia. Winters: south from Unalaska and central Quebec to northern United States; in Europe, to the Mediterranean. Open field species.
Nests: in thickets of birch, willow or spruce, usually low, or in grass tussock. Nest: of available plant material, with lining of down, feathers or hair. Eggs: 4 to 7, white, tinged with green or blue, spotted with reddish-brown, .65 by .5 inches. Nesting: most common in June. No details on incubation. Annual broods: 1 or 2.	Nests: in woods or brushy pasture lands, usually on ground; often hidden under some cover. Nest: made of grasses with finer lining. Eggs: 4 to 6, bluish, greenish or grayish, thickly-spotted with fine, brown, purple or lilac marks, .8 by .6 inches. Incubation: for 11 or 12 days. One or two annual broods.	Nests: in thickets, usually near water. Nest: on ground or in low bush, made of grasses, rootlets and weeds with lining of hair or fur. Mud may be used to help. Eggs: 4 or 5, light green or ashy, regularly dotted or marked with light brown, .7 by .8 inches. Incubation data: lacking, as are data on number of annual broods.	Nests: on grassy land, in brush, ornamental shrubbery, preferably near water; rarely in bird box. Nest: of grasses and weeds, with a finer lining. Eggs: 3 to 7, variable, greenish, grayish, pinkish, bluish, with spots or blotches of brown or lilac, .94 by .65 inch. Incubation: 10 to 14 days, by female chiefly. Broods: 2 to 4.	Nests: on the ground among rocks or grasses, usually hidden. Nest: largely of grasses, plant stems and mosses, with lining of fur, feathers or hair. Eggs: 4 to 8, white, greenish or bluish, with spots or blotches of brown, yellow brown or blackish brown, .95 by .65 inches. Incubation: 14 days, chiefly by female. One annual brood.
Food: largely of seeds of weeds and of birches and alders; also seeds of pines, elms, lindens, larch, lilac and others where they are available. In summer, plant lice play an important part in the diet. The birds are friendly, come readily to feeding stations and are generally useful.	Food: in summer largely insects such as grasshoppers, leaf-hoppers, weevils, click beetles, ants, and leaf-beetles; also some wild fruits. In winter, almost entirely weed seeds; estimated 33%, winter food, ragweed and smartweed; and remainder Russian thistle, amaranth, wild sunflower and other common weeds.	Food: essentially weed seeds. The much quoted Beal figure that Iowa has 875 tons of weed seeds consumed by this species each winter will stand repeating. Within the boundaries of the United States, it is probable that 98% of its food is weed seeds, with little or no damage to grain crops.	Food: 66%, vegetal material, largely seeds. Animal matter includes cutworms, army - worms, cabbage worms, locusts, grasshoppers, crickets, weevils, gypsy moth caterpillars, cankerworms and others. There is little, if any, grain in the diet. Some birds can survive severe winter weather. Speed: 17 m.p.h.	Food: weed seeds as well as seeds of a number of the lower woody plants such as alders. On the breeding ground during the summer months, many insects are eaten. Bills: exceptionally sharp and strong and can break seeds readily. Associated with snow by most people. Speed: 16 m.p.h.
Has bred in captivity freely although it is now against law to keep captive. Made a good cage bird. Numbers are not sufficient in the United States to expect them to be of economic importance, but a flock of them in weeds in snow helps make a winter field trip successful.	Undoubtedly a useful species. Popular in winter as a "snowbird", because, while blizzards seem to stop activities of most larger outdoor animals, they seem to hinder activities of the junco to no appreciable extent. Twittering spring song in northern migration always welcome. Song pitch: 3850 to 5500 cycles per second.	One of the best of the winter visitors, it comes readily to winter feeding stations, and by its cheerful, twittering calls in a weed patch, even in a blizzard, makes one get a different idea of what winter is like than can be had from an arm chair beside a cozy fire. One of our best friends in every way, is the tree sparrow.	Song has been well interpreted as saying "Hip, hip, hooray boys. Spring is here." Even if it did not, we might well say it when the bird starts to sing, because that is the sign that the backbone of winter has broken and pussy willows and tulips and dandelions will soon be the order of the day.	Formerly were shot for market and are still killed and eaten by natives of the North. One city was once reported to have had 80,000 snow buntings in cold storage. Fortunately, such slaughter has been stopped, but birds do not seem to have regained their former abundance. They are, alive, essentially and perennially useful.

(Continued from page 531) tions we learned a decade ago. I can remember the time when much ado was made about the data supplied by Beal that the tree sparrows of Iowa destroyed each year some 875 tons of weed seeds. This is possibly one of the most widely-quoted bits of data on the food habits of wild things. We were given to believe that this information meant that, because of the tree sparrows, there would be many less weeds in Iowa the next year. As a matter of fact, common sense tells us that this is far from the truth. The chances are good that the tree sparrows make not the slightest dent in the number of weeds that will grow the following summer. Just look in a circle of a yard around any weed top in the snow. Count how many plants of a given kind reached maturity there last year, as shown by the mature tops. The number will be surprisingly small. Then take a mere handful of seeds from any one of the available plants and see how many more seeds than plants you have. You should quickly realize that the seeds eaten by the tree sparrow represent merely a surplus that is available. Similar surpluses may be eaten from the same area by juncos, redpolls, song sparrows and other birds and still the number of weeds next summer will be just about the same. This matter of harvestable surpluses is well worth considering when we are forming an important judgment on any living thing. This does not mean that with all species of living things an apparent abundance can be harvested at any time without fear of the morrow. It does mean that there is danger in snap judgments, either as to abundance or scarcity, when it comes to this kind of study.

CROW

The food of birds of the winter is almost as varied as is that of summer birds. There are insect-eaters like the kinglets, chickadees and brown creepers; seed-eaters, like the sparrows; flesh-eaters like the birds of prey, and scavengers like the crows, gulls and other species. Birds whose food is mostly the soft bodies of insects, like the larger caterpillars, are of course absent. Not a few birds, such as the grouse, are able to change their diets with the advancing season. Because of this, they can live in winter on tree buds if necessary, and in summer on insects. Our yellow warblers, unable to make such a change, leave us, to return when their food organisms are again abundant.

Of course, if we want birds about our homes one way is to provide them with an abundance of food and suitable shelter. The United States Department of Agriculture, and other agencies, provide a wealth of free or low-priced literature on this subject, so that the list need not be repeated here. Suffice it to say that one of the most interesting of winter bird studies is built around studying the selective power of different visitants to the feeding station. A handful of mixed grains sprinkled on the feeding board is combed over and over again by the feathered visitors. The first kinds of seeds or fruits to vanish will probably be the sunflower fruits that will be gathered greedily by the first nuthatches, chickadees or sparrows to make a visit. What the succeeding order is will depend on the nature of the mixture present, and on the birds that come, but the chances are that the order of disappearance of different kind of seeds from a given station will be more or less constant. What is it at your station?

A bird feeding station and bird banding trap should be attended by every amateur or professional naturalist at some time in his life. Such an activity will teach much about what some have called the "personality" of birds. Certainly the species and the individuals of different species vary considerably in their reaction to the sensation of suddenly being made a captive. I once had a chickadee visitor that seemed to know just what to expect when it got caught in the trap. It accepted the situation philosophically and as soon as hunger and the opportunity presented itself seemed to be back in the trap again. Other birds seem to become so frightened that they immediately put as much space as possible between themselves and the point of their captivity. No one can work with animals under these circumstances and not feel differently toward them than do those who think of all birds as just "boids."

We may be inclined to sympathize with any animal that must live unprotected in the open in severe weather. Much of this sympathy is wasted if we worry about most winter birds suffering from the cold. We know that on the average the body temperature of most birds in winter is only slightly below what they enjoy in summer. This may be due to the lessened activity that accompanies longer periods of darkness. A somewhat similar rhythmic variation in temperature of birds takes place at night and in the day. In all of these cases the variation is only slight and no greater than may be induced by any excessive activity or excitement. In our domestic fowls, the body temperature is highest in June, July and August and lowest in December, January and February, whether the birds are housed in summer or not. It seems to be the conclusion of most investigators that air temperatures have comparatively little effect on the body temperatures of birds. If this is the case we need not be too concerned about a bird out in the cold if we have seen to it that he has adequate food. Of course, if he is cut off completely from his food supply that is another story, and in the case of our winter birds we can do something to correct the situation by seeing that a feeding station is put up and kept well stocked with the foods that carry our bird friends through the winter.

There are those who contend that it is foolish for us to feed chickadees and nuthatches and woodpeckers in the winter when they would otherwise be busy destroying the insects that might be injurious to our trees. If we wish to look at these winter birds from a purely economic angle, there may be reason back of these arguments, but fortunately the American character has in it something beside the mere evaluation of a friend on the basis of the size of his check book. These birds that beg from our feeding stations earn their keep by putting a smile on our faces and it is possible that if we can keep smiling the next few years this may be more important than some people believe. I for one hope that there will always be an exchange of cordial greetings through the windows of our Eastern homes between the people and the birds of the region.

As We See It

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"Monument Enough"

In a classic letter left to be read after his death, the late Irvin Cobb asked that "the plain canister—nothing fancy there, please—containing my ashes shall be taken to Paducah, and that at the proper planting season a hole shall be dug in our family lot or elsewhere at Oak Grove and a dogwood tree planted there and the ashes strewn in the hole to fertilize the tree roots. Should the tree live that will be monument enough for me."

As a people we are gradually emerging from the era of equestrian statues and carved monolithic monstrosities. The cemetery of today is a place of quiet beauty with commemorative plaques level with the ground and shaded by trees and brightened by flowers. Less and less is it regarded as necessary to compete in the size and fashioning of the granite that marks the final resting place of the departed.

All over the world today, however, Americans are giving their lives as members of the fighting forces of our country. Wherever they have fallen, and wherever they lie buried, they are heroes who have given that last full measure of devotion. Many of them will remain in hallowed ground in Europe, Asia, Africa and the islands of the Pacific, just as men who fell in World War I remained at Belleau Wood, Romagne and other American cemeteries abroad.

At home a grateful people in thousands of communities will wish to honor these heroes, to whom we cannot do honor enough. When the war is won we may expect a multitude of projects sponsored by cities and towns, veterans' groups, civic organizations and others to raise victory monuments to those who will not return. What form will these take? Will we break out again in a rash of statues, obelisks and sculptural nightmares that please only the sculptors and the memorial committees? We trust not.

There is a movement gathering momentum today that holds promise of more fitting memorials to war heroes than the past has vouchsafed their memories. It is the sentiment for living memorials. It is a movement that is spontaneous, fostered by no one organization, although here and there the idea has resulted in the formation of an official commission on war memorials. Proposals include memorial buildings at educational institutions, stadia and other structures and establishments of practical character. To us, even more appropriate are the many proposals for memorial forests and tree-shaded avenues dedicated to the war dead.

"Expressed in its simplest terms," writes Henry Clepper in an editorial entitled "Living Memorials for War Heroes" in the *Journal of Forestry*, "the thing for which the youth of America is fighting and dying is home. What is home? It is not a house, a third-floor apartment, a hotel bedroom.

"Home is an elm-shaded New England village. Home is Central Park. Home is moss-draped live oaks along the Gulf Coast. Home is the windbreak on a Dakota farm. It is cottonwoods along a prairie creek. It is Rocky Mountain National Park. It is the redwoods. It is outdoor America."

Already communities are moving to make some part of outdoor America a memorial to the heroes of Guadalcanal and Saipan; Bataan and Wake; Salerno and Anzio; Avranches and Aachen; Burma and China, and thousands of other more obscure battlefields. In several states, cities and towns have already started the creation of memorial forests that will live; that will shelter and provide havens for the sons and daughters of those who fell. Elsewhere proposals are being made for preservation of areas in wild parks, where beauty and utility may live together in perpetual memory of those such areas honor.

After World War I the American Tree Association, under the leadership of the late Charles Lathrop Pack, urged the planting of individual memorial trees, groves of trees and small forested areas. Thousands of trees were so planted, dedicated and registered. The idea of living memorials is not new but it has been proved sound. Perhaps unfortunately, no such inspirational and non-commercial organization leads the way today, although millions of lovers of the outdoors, through organizations to which they belong, are more and more urging that memorials of World War II be living ones.

To this we should like to add our voice. Whether it be park or forest, wildlife sanctuary or memorial avenue, we believe that those who have given all that was in their power to give would say that it were "monument enough."

The Seven Sisters in Sussex, the most famous of the white cliffs of England. These were purchased and preserved by the National Trust for Places of Historical and National Beauty, which is supported by private contributions. The Trust now holds more than 100,000 acres of beauty spots, architectural gems, and historical monuments. A program of National Parks in England would be additional to the work of the National Trust, and would be quite different from the organization of the National Parks in America.

Choosing Britain's National Parks

By W. S. MORRISON, M.C., K.C.

Minister for Town and Country Planning

WITHIN the compactness of their 58,000 square miles, England and Wales show greater geological and scenic variety than almost any other country in the world. The English Lake District is a jewel of rugged mountains and placid waters, of windswept moorlands and sheltered valleys. In the Peak District of Derbyshire and the Somerset Mendips, the land swells in rounded hills of sandstone and limestone, breaking suddenly here and there in deep-cleft gorges.

Within such tiny space no other country in the world can show the infinite variety of wold and moor and close-turfed downland; the unbelievable spring greenness of the dairy country in the West; the broad hedge-checkered acres of the cornlands in the East, the wild remoteness of Snowdon, and the urbane composure of the country park lands.

One-fifth of England and Wales is wild, uncultivated land—mountain and moorland and rocky coast. Here Nature is seen in her most dramatic moods. The bones of the earth protrude in cliffs and rugged peaks, and lift the rolling downlands up from the clay and gravel-filled valleys—not with the huge immensity of scale that marks the Grand Canyon or Niagara, of course, for one of the charms of England's scenery is that the features of the landscape are always in scale to her size. Her horizons neither bear down on the beholder nor run away out of sight.

The English scene is not breath-taking, anywhere, but it has, for all its small scale, a rare quality of spaciousness, a perfect and comforting quiet. At the end of the last century the people living in the great industrial towns began to be aware of this. Starting with a handful of town-weary workers, a nation-wide open-air movement was begun. By the nineteen-thirties one north-country town of some 700,000 inhabitants had come to see a regular week-end exodus of more than 15,000 people bent on recreation in the country. The Peak District of Derbyshire is ringed by more than a hundred towns where nearly eight million people live. From these towns the younger people make their way to the nearby moors and upland valleys.

For fifty years these urban country lovers have banded themselves together in associations to make possible cheap holidays in the unspoiled countryside. The youngest of them had more than 83,000 members and 300 hostels before the war. Today its membership exceeds 100,000, and these, I am told, represent only 5 percent of the people to whom the countryside ministers at week-ends and holiday times. Opinions backed by numbers of this sort have a considerable social significance. These opinions eventually crystallized into a demand that England's beautiful countryside should be protected from ill-considered development. In particular they called for the establishment of Britain's wild and remote districts as National Parks.

What do people in England mean by a National Park? To the ordinary man in the English street the word "park" conjures up the picture of either an ornamental public garden, with shrubberies and

Harlech Castle in Wales is famous in song and legend. The castle and the surrounding country are typical of an area worthy of National Park protection.

flower beds and broad gravel walks, or else the landscape-gardened demesne of a country house. In America a "National Park" means a great reserve of outstanding beauty and significance. The proposal to establish National Parks in England envisages neither of these. It would not be preserving the English scene if we laid it out in walks and avenues. Also, in Britain, we have no virgin country in the sense that most American National Parks are virgin. England's remotest areas have for long ages past supported some settled population, and there are few places, even in Wales, where the landscape does not bear signs of man's activity. On the moorland fells the hill sheep graze, and, in the sheltered valleys, mixed farming often takes both pasture and plough to the very foot of the hills.

The sort of National Park that Britain wants to see is a whole extensive area of beautiful and semi-wild country in which the characteristic landscape is carefully preserved. This does not mean shutting off the whole area as a "Nature Reserve," an Eden without whose fence the country-lover may stand and stare. On the contrary, full and proper access will be given to the public, for the only justification for preserving beauty as beauty is the people who want it. Strictly delimited "Nature Reserves" will find a proper place within the National Park in neighborhoods where the existence of any particular species of wild animal or plant seems threatened. Life within the National Park area of Britain will go on as usual, for farmer and blacksmith and shepherd alike—not as museum pieces showing a picturesque past, but as live elements in a vital rural economy that has made the country scene what it is today.

In England and Wales there are some 12,000 square miles of relatively wild country from which to choose National Park areas. It is not all suitable for preservation in this way. But even when areas of little scenic value have been earmarked for potential quarries, or military sites, or afforestation schemes, and the smaller patches have been allotted their place in green belt schemes, there still remain perhaps 8000 square miles of land lovely enough and extensive enough for England's National Parks.

In choosing which of these 8000 square miles shall be Britain's first National Parks we are taking ac-

Chiddingstone is one of the most charming villages in southeastern England. It was purchased in 1939 by the National Trust to preserve it as a place of national beauty and historic interest. Property includes inn, village shop and Tudor cottages.

count of each particular area's natural beauty, its ease of access for walkers and cyclists, its proved popularity, its existing and potential use of land. We are taking stock of any disfiguring developments, actual or proposed, of transport facilities, accommodational resources and local finances. They all come into the picture. The choice of area is carefully related to other nationally-determined land utilization schemes. The disposition of agricultural and forest zones, transport, industry and water catchment projects are all borne carefully in mind when considering the delimitation of National Park boundaries.

Choosing any region in Britain as a National Park, then, is to make two of its potential uses paramount. Firstly, the characteristic beauty of the landscape will be preserved. Secondly, the visiting public—a *national* public, not merely a local one—will have ample access to its amenities. What of its other uses? *They* will be permitted only insofar as they do not conflict with these other two, or when they are matters of public urgency that are demonstrably impossible of accomplishment elsewhere.

On the negative side, the scene will be preserved by forbidding all developments within the National Park area other than agriculture and recreation, and such extensions of existing centres of residence as an increased tourist traffic might justify. This veto would cover every kind of development, from house sites and petrol pumps and billboards, to quarries and industrial plants. Quarries and industrial plants are necessary, but so long as they *can* be situated outside a National Park area it is difficult to justify their presence within it.

On the positive side, there is room—in fact, need—to conserve, recreate and enrich the scenery, which is in all save the remotest corners of this little land the joint work of Man and Nature. If human activity decayed, so would the scene. Britain's losses in native timber during World War I, and since, for example, have never been made good. Skilled afforestation can rehabilitate the land, reclothing it where it has been laid bare and hiding those scars that outworn mining ventures have left occasionally on the countryside.

For the rest, facilities will be granted to provide the extra accommodation that will be required to house the increased numbers of country holiday makers that we think the future will bring to the National Park areas. Whether it be youth hostel or guest house or hutted camp, it will have to be harmoniously designed and discreetly placed.

In several regions that have obvious potentialities as National Park areas, such as the Lake District, North Wales and the West Country, numerous tracts of both wild and pastoral country have been preserved against the inroads of arbitrary and piecemeal development for many years past. These are the gifts of individuals or groups of people, concerned to keep some particularly cherished piece of Britain unspoiled. They have been placed in the perpetual custody of the National Trust incorporated by Act of Parliament in 1907.

The appreciation in Britain of the work of the National Trust and its patrons, through whose generosity many stretches of lovely countryside and a considerable number of famous old houses have been made national possessions for all time, finds its expression in the accumulating acres under that body's control. The places in its keeping range from historic inns in Britain's ancient cities to a 3000-acre tract of fine rock-climbing country in the heart of the Lake District, which was given to the National Trust by the Fell and Rock Climbing Club of Britain as a memorial for their comrades who fell in World War I. This gift alone preserves eleven mountain peaks with a surrounding belt of upland country.

But the holdings of the National Trust, the results of purely voluntary effort, are a significant pointer to a wider national need, which can only be met by national action. Many of these gifts, which now total nearly 100,000 acres, would take a natural place in a National Park, for establishing a National Park does not mean the compulsory buying up of a whole tract of country by the nation. At some points the nation may have to buy, and provision is being made for such purchases. But ordinarily no more than the usual procedure of planning control is required. Control there must be to avoid the mistakes of the past. In the case of National Parks, that control will be exercised in the light of the three basic considerations—the preservation of scenic beauty, the provision of free access to the park areas for all members of the nation who wish to go there, and the protection and furtherment of the normal means of livelihood of the local inhabitants in the areas involved.

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Morning of Ice

By EDNA L. S. BARKER

Now through a glassy world we walk
Where nothing breathes, or sounds, or turns.
Up from a frozen ocean's floor
Trees are white coral, white sea ferns.
Pendant from pointed icicles
The spectrum of the rainbow burns.

This Victory Garden is the pride of three Navy corpsmen attached to a Marine unit in the South Pacific. They are carefully tending a crop of radishes and corn. Elsewhere in the islands are larger gardens producing fresh vegetables in large quantities. U. S. Marine Corps Photograph.

V-Gardens Behind the Front

By ANDREW S. WING

Secretary-Manager, National Victory Garden Institute

FROM all the fighting fronts come reports that our men soon tire of battle rations, dried carrots and canned meats. As soon as they get back to base, they clamor for fresh vegetables. They are even willing to dig to get them. The service commands have encouraged this fondness for vegetables. In home camps and in bases scattered all over the world, wherever there are suitable soils and climate, our boys have been tilling the soil, and the fruits of their labor have helped to vary the monotony of a wartime diet, perhaps even to shorten the war.

"Dear Mom:" wrote an Illinois lad from the South Pacific. "Please send me some cigars. Not to smoke, as you know I don't smoke cigars. But we get awful hungry for fresh vegetables, and the only way we can get them is to trade with the natives, who like cigars."

The cigars were sent. Months later, he wrote back that the natives had grown tired of cigars. "Now they demand pipes," he wrote. So pipes were sent. A flyer, based many months in the Solomons, wrote, when on leave in New Zealand, that one of the outstanding events of his furlough was a salad for breakfast, lunch and dinner, and sometimes in between meals.

For the most part our men have grown their own vegetables in camp Victory Gardens that range from the Arctic Circle to palm-fringed isles south of the equator. This food has been grown often under adverse conditions, with the roar of enemy bombers a daily occurrence. But it has been a real contribution to the health and morale of the fighting forces. There is nothing that does more to raise or lower the morale of GI Joe than the quality of his daily mess. Some of the comments reported from our men overseas regarding the quality of K rations, and particularly dehydrated vegetables, would not read well in a family magazine. Plenty of canned vegetables and fruits have been set aside for the use of the armed forces, but these do not always reach combat zones, nor do they quite take the place of the fresh article. And so it has required no more than a hint on the part of commanding officers, in many cases, to get volunteer workers to plant camp Victory Gardens. The U. S. Marine Corps reports: "Victory in the Pacific has taken on a new meaning to the Marines. The rapid

Professor Hugh Findlay of Columbia has devised garden implements especially for the use of the blind. Armand Michaud, blind since ten, demonstrates one of these at the Perkins Institute for the Blind.

pace of conquest means Victory Gardens—fresh fruits and vegetables—as well as defeat of the enemy."

Corn, tomatoes, carrots, peas, sweet potatoes, and squashes, corner-store products so familiar to Main Street, but strange to the islands of the Pacific—are now being served America's fighting men battling to crush Japan. And they come direct from Victory Gardens that only yesterday were enemy encampments or defense areas.

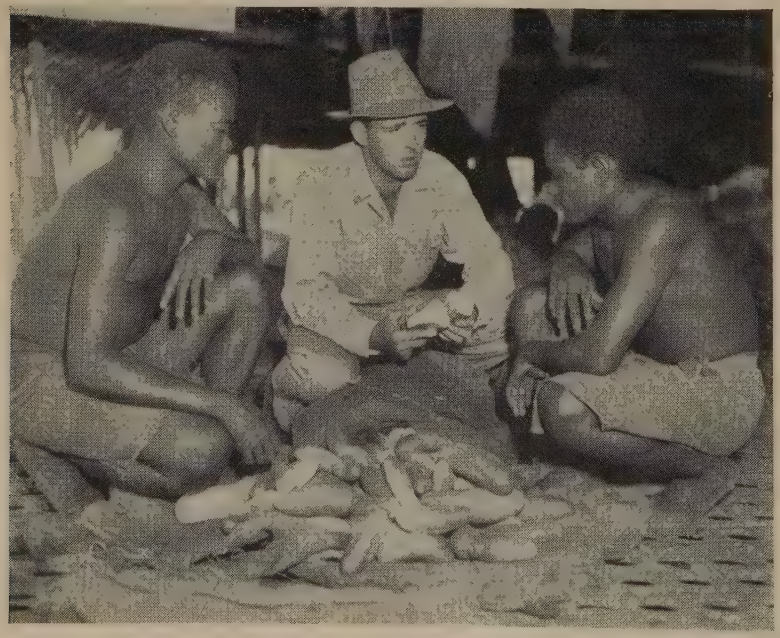
There is a 50-acre American farm on Bougainville in the Solomons. It was turning out victory crops for our fighting men even before the Japs on the island had been completely neutralized. Thousands of soldiers, sailors and marines in the Pacific are eating fresh vegetables from 5000 acres of once-dense jungle lands now under the plow. The rich volcanic soil of these island gardens from New Caledonia to Bougainville will yield close to 150,000 tons of food in 1944, and the value of the crops will run into millions of dollars. The saving in transport space alone is tremendous.

Battle-hardened mess sergeants are now decorating their tables with such delicacies as eggplant, cucumbers, lettuce, radishes, peppers, sweet corn and—believe it or not—watermelons. As long ago as last Christmas, marines at one base were amazed to find an almost endless supply of sweet corn on the table. In no time at all 15,000 ears of Golden Bantam disappeared, which is quite a record even for marines.

More than 2000 acres of Guadalcanal are now under cultivation, with a production estimated at more than 60,000 tons of fresh vegetables yearly. At Villa, on Kolombangara, the actual airfield from which Jap planes formerly flew to bomb the marine conquerors of Guadalcanal, is a 64-acre farm where fruits and vegetables are growing profusely.

The task of growing these vegetables for the men overseas was not easy. Marines kept their rifles handy while they cleared and plowed the land with tractors and bulldozers. Seeds and expert advice were supplied by the Office of Economic Warfare. Often the seeds rotted in the damp climate before they were even planted. Refrigeration cured that. The plants would grow fast in the torrential rains, but sometimes refused to behave properly. And, of course, there were insects. OEW experts supplied chemicals with which to fight the bugs and diseases. Studies were made to determine which crops and varieties were best suited to tropical conditions. Now, on Guadalcanal, pineapples and bananas imported from Hawaii are being raised where formerly the chief crop was coconuts. Honey bees did not do well, but ducks prospered and are now commonly seen in the camp compounds.

Best of all is the prospect that new crops and farming practices will be developed for the natives to use in post-war days. It may mean an entirely new economic life and diet for many of the islanders.



A representative of the Office of Economic Warfare inspects a cucumber crop raised by natives on one of the many farms now producing fresh vegetables for men in the area of the Solomons. A wide variety is now raised and progress made with fruits.

Natives working on a Red Cross farm project on an island in the South Pacific now occupied by the Marines. The dietary habits of many natives will be changed. Marine Corps Photograph.

From nearer home come reports of camp gardens that are just as successful, although not so spectacular. For instance, there is the San Antonio Cadet Center's Army Air Forces Regional Hospital in Texas, where convalescent patients work an acre-and-a-half Victory Garden. Since the ground was first broken last January, there has been a constant turning over of the soil, and the mess hall has been supplied with tons of vegetables. Private Oland Woodall, a floriculturist from Shawnee, Oklahoma, directs the work systematically so that a maximum crop can be produced from such a small acreage. The wholesale value of the crop has long since outstripped the initial cost of seeds, insecticides and gardening tools. Even greater value is shown in the curative results, patients showing rapid recovery when working in the garden. Not only is the patient kept mentally and physically occupied, but wholesome work in the fresh air and Texas sunshine have often been responsible for reducing the soldier's stay in the hospital as much as twenty-five percent, returning him quickly to duty.

The therapeutic value of gardening for veterans convalescing from either wounds or nervous shock is well known. The healing power of wholesome work in the good earth has been demonstrated again and again. There is something elemental and at the same time rejuvenative in tilling the soil, burying a seed and watching it develop into a mature plant. It restores man's faith in something outside himself; something bigger and stronger and finer. He soon learns to "bury his troubles in the garden" as a friend of mine used to say.

In no field of service has this been more dramatically proved than in the work with the blind. During the first few months after a man has been blinded he feels utterly hopeless and helpless, as though cut off from life itself by the loss of vision. Unless carefully nurtured and encouraged, a blinded person crawls within his shell and wants to do nothing but sit and brood over his misfortune.

There is a school for blinded Army veterans at Avon, Connecticut. It was formerly Avon Old Farms School and is a beautiful place. Among the important activities, which include the teaching of Braille, there are classes in gardening, with instructors. I have not yet visited this (Continued on page 550)

The Navy farms as well as fights. At the Chapel Hill Pre-Flight School the cadets have a Victory Garden. Here two husky future flyers bag corn. The project helps in physical training and at chow. Official Navy Photograph.

More widely known among cross-word puzzle addicts than among bird students is the—

Smooth-Billed Ani

By GRACE V. SHARRITT

Illustrated by Walter A. Weber

CROSS-WORD puzzlers know ani as a convenient three-letter word for a species of black bird of the cuckoo family. Ornithologists know it as a bird of casual rarity in southern parts of the United States. I know this high-beaked, black-feathered fellow, with its long somewhat oversized tail, as an amazing five-day acquaintance of a Florida visit.

My things were scarcely unpacked when my friend, Betsy, arrived, gasping, "Come quick! I've just seen the darndest-looking birds over in the tomato patch by the golf course." Betsy has traveled widely; if she was excited there must be a real reason. So, armed with field glasses, pencil and notebook, I followed her to a little dirt road at the edge of Hollywood, where truck gardens of red tomatoes and green peppers flourished.

"Look," she whispered, waving her binoculars dramatically toward the sky above the garden. Over the workers gathering the harvest winged five of the oddest birds I had ever seen outside a book or a zoo. They had beaks like parrots, although not as pronounced, and they were black with only slight iridescence. They were arrogant-looking birds, like haughty members of some dusky, feathered peerage, lacking only a monocle to complete the effect. One high-nosed fellow flew toward us to settle in a pine, balancing his tail in flight with great difficulty, like a boy's kite settling and wobbling in the wind.

"What's the name of those birds?" I called to one of the workers, who by now were mystified by our suppressed chatter, gestures and dashings up and down the road.

"Oh, dem's blackbuds," he laughed.

"Have they been here long?" I persisted.

"'Slong as I bin," he grinned.

Not caring to go into his genealogical history, I suggested to Betsy that we go to the town library and hunt up a book of Florida birds. There we thumbed through various volumes, working in the dark because we had no idea under what classification our birds came. Finally we found a picture. It was called the ani, so with this lead we found that Howell's *Florida Bird Life* classified it as a cukoo—Family Cuculidae. Black parakeet and black witch were a couple of its popular names; *Crotophaga ani* its Latin name.

We learned that our birds were related to the desert road-runner, as well as to the yellow-billed cuckoo. We discovered that there were two species, the smooth-billed ani and the groove-billed ani, the latter with three grooves in its upper mandible, and the name *C. sulcirostris sulcirostris.* Ours, we were sure, had a smooth bill, although both species are now and then found in Florida.

Armed with this information we went back to our clinical laboratory at the tomato patch. The anis were still there, which was itself somewhat of a record, since birds under study rarely cooperate that pleasantly. One flew awkwardly to a Royal palm; another hopped and ran along the grass, tail bobbing up and down as it hunted insects and lizards. The others perched on tomatoes and other plants, seeking insects.

It was about four in the afternoon, five days later, that we saw the anis for the last time. There was a high wind and the grotesque tails of the birds wobbled crazily as they flitted about. The anis made strange mewing sounds. One Lancelot was feeding his lady a squirming lizard. We decided that it must be mating time. We wondered where they would nest, and we wondered, also, whether other bird lovers would believe our story. (Continued on page 552)

To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then, below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south. Time given is Standard Time; add one hour for War Time.

Seeing Our Planet from Other Worlds

By ISABEL M. LEWIS

IF ONE could journey through space from the earth to neighboring worlds in the solar system it would be found that great differences exist in the appearance of our planet as seen from each of these other worlds.

As seen from our own satellite, the moon, the earth is a magnificent object, surpassed only in splendor by the sun. Only Jupiter or Saturn, viewed from one of their nearer satellites, could possibly compare in interest with our planet, Earth, seen from its satellite. At the time of Full Earth—when the earth as seen from the moon is in the same phase as the full moon as seen from the earth—the day side of the earth is turned toward the moon and fully illuminated by the sun's rays. The earth disk is about sixteen times greater in surface area than the disk of the full moon. Permanent surface markings, easily seen from the moon, would be its great oceans, seas, lakes, continents and large islands, its snowy polar regions and its seasonal changes of color in the temperate zones. Transient markings would be storms and clouds, and now and then, at time of an eclipse of the sun by the moon, the fleeting shadow of the moon passing as a dark spot with wide penumbral shadings across the bright day side. Since the moon always keeps the same side turned toward the earth, the position of the earth in the lunar heavens changes little in the period of one revolution of the moon around the earth, as seen from any one place on the side of the moon facing the earth.

There will be a swaying back and forth of the earth in the lunar heavens because of what is known as the libration of the moon. The rapid rotation of the earth on its axis in its twenty-four-hour day, and its phases,

which are always the opposite of those of the moon as viewed from the earth, add greatly to the beauty of our world as seen from the moon. A fascinating picture is presented of continuous change and variety such as never occur in our observations of the moon. If the lunar inhabitants possessed a telescope comparable to the Mt. Wilson 100-inch instrument, it would be possible to identify objects less than a mile in diameter; and what an endless variety of small objects of great interest on the earth would be brought into view! The observer on the moon would see intricate and minute markings on the surface of a great world; rivers and lakes; countless islands of the Pacific and other oceans; cities and even small towns in great numbers! One may imagine how inhabitants of the side of the moon from which the earth is invisible would make excursions to the opposite side to gaze upon this beautiful world in the sky.

Next to our satellite, the best views of the earth would be obtained from the planets Mercury and Venus. The orbits of these two planets lie inside the orbit of the earth, hence, viewed from the earth, they exhibit phases like those of the moon. If there were observers on these worlds, however, the earth would be seen in the night sky under very favorable conditions, not as Venus and Mercury are seen by us, as morning or evening stars, never at great distances from the sun. There would be no phases to the earth as seen from these two worlds.

A unique feature not observable in the case of any other planet with satellites would be the great size of our satellite relative to the earth. An observer on Mercury or Venus would see the earth-moon system as a beautiful double star; the moon, one-fourth as great in diameter as the earth, would be seen to revolve around it continuously, at times at considerable distance to east or west of it, and again so close, when the two are nearly in line, as to give the appearance of two magnificent stars almost in contact.

The earth as seen from Venus—at the time when Venus is in inferior conjunction with the sun—is in the midnight sky, and far more dazzling in splendor than Venus is to us at time of its greatest brilliancy. Even the moon then appears as brilliant as Jupiter does to us. Although this is the time when the earth is most brilliant as seen from Venus, it is an object of great splendor for a considerable period on either side of its date of opposition, just as Mars is to us an object of great splendor for some days before and after its date of a close opposition. At such times Mars comes to within about 35,000,000 miles of the earth and is more brilliant than Jupiter; but the earth, when it is in opposition to the sun as seen from Venus, is at a distance of only 25,000,000 miles from Venus, and is, moreover, nearly twice as great in diameter as Mars. Thus its surface is about four times greater, and, for this reason alone, would be four times more brilliant than Mars as seen from the earth at opposition.

The fact that Venus, at time of nearest approach to the earth, is 10,000,000 miles nearer to it than Mars can ever be, still further increases the splendor of the earth as seen from Venus. The reflecting power of the earth's surface is also greater than that of Mars, because so much of its atmosphere is filled with clouds, and much of its surface is covered with snow or ice. So, everything considered, our planet is an object of great splendor viewed from Venus, far exceeding that of any planetary object visible in our own skies. Although it is not so favorably placed with respect to Mercury, because of the greater distance of the earth from this planet, it is still a strikingly beautiful object viewed from this planet as well.

In the Martian skies the earth shows phases like those of the moon, as it does from all of the other planets of the solar system beyond Mars. It is also visible from these planets only as a morning star before sunrise, or an evening star after sunset, if seen at all. Viewed from Mars the earth never gets more than about 38 degrees to the east or west of the sun. Venus, viewed from the earth, gets, at the most, more than 48 degrees from the sun. So the earth is more closely confined to the neighborhood of the sun, as seen from Mars, than is the planet Venus when viewed from the earth. The earth is also not quite as brilliant in the Martian skies as Venus is at times in our sky, for it never gets as close to Mars as Venus does to the earth. It is, however, a very brilliant and beautiful object in the Martian sky in the twilight hours, with its bright and faithful little attendant, the moon, always close by.

As one journeys outward in the solar system in the direction of Jupiter, and the other major planets of the solar system, it will become increasingly difficult to find our comparatively small world, as its elongations or distances east or west of the sun decrease. As in the case of observations made from Mars it will always show phases, and, at its greatest distance east or west of the sun, or greatest elongation, it will have the phase of half-moon in the telescope. At the distance of Jupiter it would never get more than about ten degrees distant from the sun. It would be practically impossible to pick it (Continued on page 552)

Observation

By PAUL CHURCHER

I've mastered systems, solar;
A few odd-billion stars
Are as familiar as the polar
Ice cap of our neighbor, Mars;
Venus's orbital pattern
I've computed to the minute;
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December's Authors

Charlotte Hilton Green is author of *Birds of the South* and *Trees of the South*, and writes a regular Sunday feature entitled "Outdoors in Carolina" in the Raleigh *News and Observer*. . . . Ellsworth Jaeger is Curator of Education of the Buffalo Museum of Science. . . . Mr. Brockner is a private in the United States Army, but still a member of the Buffalo Ornithological Society and formerly an instructor in ornithology at the Buffalo Museum of Science. . . . Dr. Stahnke is director of the Poisonous Animal Research Laboratory at the Arizona State Teachers College, Tempe, Arizona. . . . Mr. Sanders is a newspaper editor, having served the Fourth Estate in Tacoma, Washington; Denver, Colorado; Dallas, Texas; Memphis, Tennessee; Houston, Texas; Little Rock, Arkansas, and Pensacola and Jacksonville, Florida. . . . Miss Huggins lived and taught in China for many years. . . . Grace V. Sharritt is a free-lance writer on Nature, formerly author of a Nature column, "Outside the Kitchen Door", in the *Detroit Free-Press*. She is currently in California.

Ancient Fish

A fish estimated at almost 10,000 years old was recently found in the course of excavation work in a clay pit near the ancient university city of Uppsala in central Sweden. It lay imbedded in laminated mud and was extraordinarily well preserved; even the scales still remained. Upon expert examination of the clay it was found that the fish, which had probably measured about 16 inches, must have lived well over 9400 years ago, according to a special chronology drawn up by the late Swedish professor of geology, Gerard De Geer, on the basis of the annual layers in the laminated mud. At that time it swam around in the post-glacial ocean which covered central Sweden to a height of more than 450 feet at the end of the ice age. Finds of vertebrates in the glacial clay are rare, and it seldom happens that such an exact dating can be made. Another interesting discovery was made some time ago in the northern Swedish province of Jämtland, where workers digging in a layer of moraine soil came across some skeleton remains of a mammoth. According to the experts, the animal had probably fallen into a crevice when roaming across the melting inland ice. It is the first find of mammoth bones in Sweden, although teeth and tusks of mammoths have been found before at three different places.

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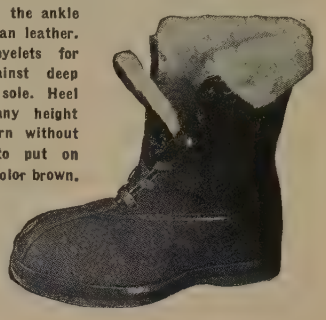

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The School Page

Edited by E. LAURENCE PALMER

Professor of Rural Education, Cornell University
and Director of Nature Education, The American
Nature Association

Birds at School

WHILE many teachers send to biological supply houses for pickled earthworms when the worms are common on the sidewalk in front of the school, and others get from similar sources the grasshoppers, crayfish, perch and spirogyra that their students study, a surprising number break from these established routines and actually do something to bring living, free, active birds near to the school where they can be seen in the flesh. This is encouraging. It is possible that if more teachers did this they might also see the desirability of studying the spiders and houseflies to be found in most schools, and of using other local familiar things that have more teaching possibilities than do most of the text-book pages. For this reason, this page this month is devoted to a reiteration of the value of some of the practices already followed by many, with suggestions of new ideas and methods that may be identified with this work.

The special insert in this issue of *Nature Magazine* deals with winter birds of the East. Earlier numbers presented game birds, shore birds, and some common western birds. Detailed life history material has now been given in this form for more than sixty species of birds, so probably there are few schools whose local bird species have not been so treated.

Winter bird study, like the study of most conservation subjects, depends upon getting, using and maintaining the particular objective material involved. We get birds to study by attracting them with food and shelter to a point where they can be conveniently observed. We may keep them near us by providing suitable nesting sites, often in the form of bird houses.

Attracting Birds

Books have been written on the methods of attracting birds to our homes. The essentials of what these books tell us are that the bird must have food easily at hand, and that it should be free from its natural enemies when the food is being taken. If we wish to attract such seed-eating birds as the cardinals, tree sparrows, juncos and song sparrows, we make seeds available to them. If we wish to attract birds that feed more exclusively on insects, we use some meaty substance like suet, or some oily seeds like the fruits of sunflowers. To such lures will come nuthatches, chickadees, titmice, the woodpeckers and the like. True, these birds will eat many of the common seeds on our feeding stations but like us they have their preferences.

Now, no one can expect to have his windows crowded by flocks of chickadees by just putting a few bread crumbs on the snow outside the window. Some people seem to think that they can. Rather, birds, like women, must be lured. You have to lead them to a meal; at least that is true for some of them. And leading and luring are done by putting out suitable food where the birds are normally found, then, when the food is being taken, placing new supplies closer to the point where we want the birds to feed. Eventually, birds that would never have found a meal there come readily to one's window.

I know of one bird club, The Sassafras Bird Club, that used regularly to put out suet for the birds of their neighborhood. When the supplies were visited the next day, it was found that they were gone. Eventually, it was found that a local "character" was following the bird club members about, collecting the suet and selling it for fat. So it is well to place it where it will be harvested by the desired parties. Suet is often held in place by metal screens, but this is not desirable since the metal has been known to be so cold as to hold and freeze the moist eyes of feeding birds. A fiber mesh is preferable.

Foods for Birds

Suitable foods for attracting birds in winter may be apple cores, bread crusts, chop bones, and similar household wastes, if it is not possible to get grain screenings, suet, coconuts or peanuts. A board, punctured abundantly with auger holes that are filled with peanut butter, or into which melted waste fats are poured, will attract birds. A line or wire strung from a window to a distant tree may bear a pendant tray with food. Each day this source of supply may be brought nearer the window until the bird readily visits what it would formerly have avoided. These are a few suggestions for getting the birds to where they may be studied.

Now, what are we to do with them? They can answer many appropriate school questions. We can find what they eat and how they eat it; where they live and where they have been, for example. What they eat may be answered by superficial observation, or it can be answered by the simple technique of putting on a feeding station one hundred each of various kinds of seeds. Then, after a series of visits by a given kind of bird, we count the remaining seeds and see which kind were preferred by that kind of bird. If units of a hundred are used, repeatedly, the results seem to be more comparable than if smaller numbers are used. Crude paper trays bearing sticky bands on which these seeds are placed in an orderly series of sequences may be put before feeding birds without seriously disturbing them. If, for example, all of the widely-scattered sunflower seeds are removed before any of the wheat grains are taken that should tell us something about the preference the bird has for sunflower.

Banding Studies

If someone in school has a bird banding permit (and every good-sized school should have such a person), then birds may be captured in the usual cages, banded and freed for later observation. Some students have made excellent studies by coloring parts of individual birds, either with dyes or with extra feathers fastened to a tail. A junco with a single bright yellow tail-feather can easily be followed and identified by this method. If notes are then kept as to where this bird is seen, excellent records can be developed as to the individual range of this, that, or another species.

With these suggested studies, then, we have an opportunity for making significant nutrition studies and significant geographical distribution studies. Just think, many of the birds we will see this spring have wintered in South America, and yet few of them carry messages to our friends to the south, or from them to us.

And now we come to what we can do about keeping the birds with us after getting them to come to us, and after studying them. They say that the development of manual skills is a legitimate function of education. If so, the making of bird houses offers an excellent opportunity in this realm. But just making a house that looks like our house is no guarantee that it will be suitable for a bird.

Many children making houses seem to think that the doors of bird houses must be at the bottom as are the doors of our houses. They think that all birds are content, as are some of us, to live in apartment houses. They think that a brilliantly painted house stuck conspicuously on the end of a pole in the sun is what a bird considers ideal. These are just a few of the errors I have seen common to bird houses made in the usual competition set-up. Books published by the Audubon Society, by the United States Department of Agriculture and by many agricultural colleges give us working plans for making good bird houses. They should be consulted. But we need more than just working plans. We need intelligence if we are to win the confidence of a bird.

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Many birds in their earliest life stages are destroyed by excessive heat, so houses should be properly ventilated and placed. Bird houses that are used in succeeding years may carry over the parasites possessed by the earlier residents. We need to have houses that can be thoroughly cleaned of the accumulations of parasites and filth. Many late-nesting species, like the blue birds and martins, find the better nesting sites pre-empted by the less desirable starlings and English sparrows. We need some provision for keeping these vagrants in their places. If children must paint their bird houses brilliantly, then let them set up a row of similar houses differently colored to learn how the birds themselves feel about it. Do the birds show any preferences? Simple cylindrical houses, made of roofing paper and painted different colors, may lend themselves easily to this sort of investigation.

Here, then, we have reviewed a few old and new ways for studying old friends. There will always be those who have still different ideas and convictions. The editor of this page would welcome an exchange of ideas on this or any other subject.

Hannibal's Elephants

Hannibal's Elephants. By Alfred Powers. New York. 1944. Longmans, Green and Company. Illustrated by James Reid. 272 pages. $2.25.

Hannibal's military exploits have been told and retold, and there are few who have not heard the bare facts of the part played in the crossing of three great mountain ranges by the elephant corps of this military conqueror. Alfred Powers felt, however, that the elephants had not received their proper share of attention and acclaim. So he has written a story from the point of view of Agenor, an elephant boy with Hannibal's army, and Old Anak, a great elephant of the corps. The result is a fascinating story of Carthaginian conquest; exciting history in fiction form.

Insulator Targets

We thought that sporting ammunition was scarce but it appears not to be too scarce to prevent hunters from taking practice shots at insulators on the lines of the Rural Electrification Administration's systems. This thoughtless target practice may result in power failure to a farmer when he needs it most. It may cause spoilage of meat when current is cut from a farm refrigeration plant, loss of milk from the same cause, or death to baby chicks when brooder house heating fails. Manpower is at a premium on maintenance of power lines so the REA urges the careless gunner to observe the maxim: "Insulators are scarce—so are shells—save both."

The Christmas Period Draws Nigh!

And, it isn't one day too soon to begin doing your Christmas shopping. Actually, it is high time you started checking your lists and adding the names of new friends you have made during 1944 or favorite relatives to remember.

Then comes the important matter of selecting the gifts. Christmas brings myriads of gifts—a few to be treasured and kept for years, but many which hold interest hardly through the holidays. Novelties disappear, books are read and set aside, useless gewgaws are quickly forgotten.

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V-GARDENS BEHIND THE FRONT

(Continued from page 543)

school, but I am told that these men are learning a new sense; making their hands do the work of eyes; doing remarkable things in a relatively short period of time. They come to know the plants by their feel and in some cases by their odor.

Professor Hugh Findlay, who teaches landscape gardening at Columbia University, first told me of the work with blinded gardeners at Avon, and at several civilian homes for the blind. He first became interested in this work during World War I, when he was in charge of the Army camp gardens for the Quartermaster Corps. Then he saw the blinded men in the hospitals and was moved by a desire to help them, which has persisted to this day. "They need the strength which comes from the soil" is the expressive way Hugh Findlay puts it. He soon found that the great need was for special tools suited for use by the blind. By much experimentation he finally invented such a set and found a manufacturer who would make them without profit.

I have seen these tools, and they are remarkable. The cultivating instruments are guided down a row by a wire that passes through a ring and is stretched taut between two iron stakes. The spade has a cross piece that permits it to be forced into the ground just so far. It is Professor Findlay's hope that sets of these tools may be made available for the general use of the blind who wish to learn to garden either at home or in institutions.

Gardening has been made a major project at the Lovell General Hospital at Fort Devens, Massachusetts. Captain Sidney Lich, reconditioning officer, has an absorbing article in a recent issue of *Horticulture*, in which he says: "Gardening, which offers all ranges and degrees of motion of almost every joint and muscle in the body, is an ideal form of occupational therapy for at least half of the year in any part of the country. . . . There is far more to gardening for the patient than work. In a recent informal survey, the author found a genuine interest in flowers in eighty-five percent of the soldier patients questioned."

The Garden Club Federation of Massachusetts has been most helpful in encouraging this work by contributing services as well as equipment and material. Similar fine work has been done by garden clubs in a number of states. The Garden Club of America has had as a project the landscaping of Army camps and hospitals in various states, especially California. Those who can remember the barren Army post grounds of the first world war are agreeably impressed with the generally improved appearance of the camps in this war.

The American Red Cross also has done a fine work in starting Victory Gardens, both for service men and for rehabilitation of undernourished natives in many parts of the world. When the whole story can be told, this may prove to be one of the finest of the many great contributions made by the Red Cross during the war.

The work that our men in the service have done in Victory Gardens, or have seen done, may have something to do with the desire of many of them to become farmers or gardeners when they are civilians again. Perhaps, too, they are inspired in part by the beauties of the English countryside, where as one soldier put it, "the whole country looks like a garden." Or by the terraced hillside beauty of Italy, and the neat little hedged-in fields of Normandy. Or perhaps it may be a natural revolt against cities, masses of men, that makes them wish to get back to the land where there is light and air and room to turn around, and one can a least grow his own food and have some freedom. Whatever it is, surveys show that a large percentage of the men in the service are thinking seriously of farming when they return.

In closing just one word of caution lest I give the impression that our soldiers and sailors and marines and their feminine comrades have no gripes, or anything to complain of in the way they are fed. In spite of all that is being done to feed them better and make them more comfortable, they will not be satisfied until the war is over, and with good reason. When the fighting stops, the Army has plans to feed the troops abroad better, and that will mean less of dried and canned rations and more meat and good fresh vegetables. So it looks like Victory Gardens are the order of the day, over there and over here, for quite some time after the shooting is over.

CANNY WOODPECKER

By AMALIA M. WESTON

"This past summer, while vacationing at "Lift the Latch" fishing camp on French River, Ontario, I saw what was to me conclusive evidence that birds think and plan in their efforts to obtain their daily supply of insects with a minimum of effort.

A black spider had spun its web on the outer edge of and under the eaves of the porch attached to the front of our cabin. One side of the web, which was about two feet in diameter, was attached to the porch, the other edge to an electric light wire supplying current to the cabin lights.

While sitting on the porch one afternoon, I was watching a large fly buzzing and twisting around the porch. Finally, it flew too close to the spider web and instantly became hopelessly enmeshed. Almost immediately a crested woodpecker alighted on the side of a pine tree that stood about three feet distant from the porch. It was plain that the woodpecker had seen the helpless fly. Instead, however, of promptly helping itself to an already captured dinner, the bird scurried around to the opposite side of the tree, and watched the fly from behind a small cluster of leaves.

In a few moments, Madam Spider came scurrying down her web from her nest up under the eaves of the porch. As spiders do in such circumstances, she proceeded to wind the fly tightly in a ball of her silken thread. The prey secured to her satisfaction, she started upward with it to her nest, presumably to enjoy her feast at leisure. She had reckoned, however, without the woodpecker, which remained hidden from sight until the wrapping of the fly had been completed. Then there came a dive-bombing whirr from the tree, a flash of silver and red, right through the heart of the web, where the spider and the fly were then located, and in the fraction of a second, both fly and spider had disappeared. The woodpecker, flying in a circle, returned to the tree, where it proceeded to pick from its breast and wings some clinging remnants of webbing.

Did the woodpecker know, on seeing the fly enmeshed, that the spider would soon come after it, thereby presenting an opportunity of securing two items at one bite? I believe that it did.

McKinley Wolves

The Wolves of Mount McKinley. By Adolph Murie. Washington, D. C. 1944. Superintendent of Documents. 238 pages. Illustrated. Forty cents.

Much publicity has been given in recent years to alleged depredations by wolves on the big game and reindeer herds in Alaska and in Mount McKinley National Park. Much of this has been based upon hearsay and prejudice. What were the facts? The National Park Service needed to know the place of the wolf and other natural predators in relation to the hoofed mammals, in order that a policy might be adopted. Adolph Murie, biologist of the Fish and Wildlife Service, was assigned to find out, and conducted a careful study. This book is the report on that investigation. Dr. Murie found that the wolves operate as a stabilizing factor in keeping the Dall sheep herd within the proper limitations of their habitat; that they preyed on the weak and diseased. He found that the wolves prey more heavily upon caribou, yet the park herd appears to be maintaining its numbers. He discovered that the moose population in the Park has increased notably despite the wolves. Dr. Murie's report constitute an extremely interesting study of ecological relationships, many of which are fundamental. It is interesting and valuable to all interested in wildlife conservation.

Testimony

"I am tremendously impressed with the W. Scott Lewis comment on page 397 of the October issue of *Nature Magazine*," writes C. M. Goethe from Sacramento, California. This comment pointed to the many men who have been rejected by the armed services as physically unfit, and contended that interest and activity in the outdoors would have vastly changed that picture. As testimony in support of the views of Mr. Lewis, Mr. Goethe writes:

"In the lounge of a Sierra resort recently, there came to the table where I was reading a United States Navy bluejacket. He laid down on the table a common paper bag, such as is used by grocers. Out of it came a dozen rock and mineral specimen. He said: 'I am told you can identify these for me'. He had picked up with unusual judgment quite a series of specimens. His day's hike had evidently been along the contact between the portion of the great Jurassic batholith underlying the California Sierras and the beautifully banded zebra-like Fallen Leaf Lake quartzite. His specimens included the following:

"Garnetiferous granite . . . Vesuvianite . . . bluish-black tourmaline . . . some beautiful apple-green epidote crystals . . . a very fine actinolite, showing the rays which gave this mineral its name from the Greek actina. . . . One of the specimens was an amethyst, a portion of it well enough colored that I advised him to have it set, as a unique ring for his young bride, by some competent jeweler.

"This sailor labelled each specimen carefully. I asked him what he would do with them. He said 'I live in a prairie state which has very few minerals. Being in the Navy, I have shore leave at ports all over the world. After long days at sea, particularly under the tense condition of U-boat warfare, a man needs relief. Only too many sailors seek it in dives where they swill down "fixed bayonets"—I determined that, even on a short leave, I would hike for mineral specimen, and find somebody who could tell me what they were—I ship the package back by parcel post—I already have quite a collection'. He added 'I doubt if you can fully grasp what thinking about his hobby means to me when one never knows, hour after hour, when he can expect a U-boat torpedo'."

Versatile Soybean

Contrasting the use of soybeans for food in the Orient and in the Western World, W. J. Morse, U. S. Department of Agriculture specialist on the crop, says that "a more versatile plant than the soybean has never been known to science."

In the Orient, he says, the most commonly used soybean food products are bean curd or tofu (fresh, fermented, dried, and frozen), bean milk, various forms of fermented paste, bean flour (whole bean), roasted bean confections (cake and candies), green vegetable beans, soy sprouts, coffee substitute, numerous health drinks (roasted beans and bean flour), boiled beans (with rice, millet, and kaoliang), soy sauce, and bean oil in cooking. The Orientals prepare the soybean in hundreds of ways and can produce almost any flavor of meat, fish, or fowl with the various soybean products.

In the Western World, the soybean and its products have attracted attention as food at various times, but only within the last three or four years have there been general investigations by commercial interests. Many food concerns are now manufacturing products wholly or in part from the soybeans, such as baked beans, canned green beans, roasted beans, breakfast foods, soy butter, candies, chips or meats, chocolate and other beverages, coffee substitutes, crackers, curd or cheese, diabetic foods, flakes, flavoring, flours and flour mixes, grits, health foods, ice cream powder and cones, infant foods, lecithin, macaroni products, malted products, meat-like products, milk substitutes, puffs, soy sauce, sandwich spreads, and toast.

In the United States, the products receiving the most attention are flour, grits, flakes, and soy meats, of which soy flour is the most widely used. There are three general types of soy flour—full-fat, medium-fat, and low-fat.

Aquatic Plants

Aquatic Plants of the United States. By Walter Conrad Muenscher. Comstock Publishing Company, Ithaca, New York. 1944. 374 pages. Illustrated. $5.00.

Any book must be evaluated in terms of other books serving in the same general field. This book is competitive with Fassett's *A Manual of Aquatic Plants*, McGraw-Hill Company, with *Food of Game Ducks in the United States and Canada* by A. C. Martin and F. M. Uhler published by the United States Department of Agriculture, and with McAtee's *Wildfowl Food Plants* published by the Collegiate Press of Ames, Iowa. As a taxonomic guide, it excels its competitors, although it deals with fewer species than are considered by Fassett. It lacks wholly the data on the value of the plants to wildlife, so adequately developed in its rivals especially by Fassett. A useful table on numbers, weight and germination of seeds of aquatic plants is unique, and, since propagation of aquatic plants is essential to some wildlife management, the book will find a place in wildlife literature. The line drawings used as illustrations are superior. This book is a valuable addition in a field in which there is little available.

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THE "FIVE POISONS"

(Continued from page 528)

they are considered efficacious in the prevention of colic. In fact, an apron of this sort is a charm against anything that might be harmful. Children also wear brass amulets upon which the five animals are cast in relief.

Another charm of a somewhat different nature is the chenille hair ornament worn by Peiping women for the *Tuan Yang* Festival. Suspended from the tiger, an animal that is supposed to possess great devil-vanquishing powers, are the "five poisons" and the gourds of longevity. Red, the color of happiness and good luck, predominates in this entire decoration.

In specter exorcism antique bronze mirrors are highly esteemed, so it seems fitting that the "five poisons" have been utilized in the design embroidered on a mirror case.

Just as appropriately, they appear on a bed valance that came from the interior province of Shensi. Everything about this textile suggests that it was part of a bride's dowry and was probably made by the bride herself, or by her mother. In the central portion of the valance is portrayed a scene from a play called "The Butterfly Cup," the bridal boat occupying the place of importance. In the dish on the table are the "three abundances," the fruits that are symbolic of long life, prosperity, and numerous descendants. Above, on the left, is the beneficent dragon, rain-bringer, hence, food-provider. By the left end of the boat is the three-legged toad, representing the wish that there will be wealth in the new household. Balancing these motifs, the "five poisons" encircle the opposite end of the boat and form a charm to protect the new home from illness.

Sometimes this same protective charm is used as a design that Chinese women embroider on the ends of their hard bed pillows. Vendors cater to the superstitions of their customers by providing thin paper cut-out patterns of the "five poisons" to be pasted on the cloth and then covered with skillful stitches.

Such household articles as the pillows and bed valance are for year-round use, in contrast to the paper charms and chenille hair ornaments used primarily during the festival. For continuous use, also, is a silver and kingfisher-feather brooch from Szechuan.

The same type of imaginative craftsmanship that produced the brooch suggested to another silversmith that he enhance a gourd cricket-cage with a silver lid. With natural grace the snake was coiled about on the lid and then the other four creatures were carved around it.

The very acme of honor is shown to the "five poisons" in an elegant amulet of jade—that stone which, precious above all other gems, is verily the "jewel of Heaven."

Just as in America Thanksgiving Day has its pumpkin pie and the English Christmas its plum pudding, so in China the *Tuan Yang* Festival has its *wu-tu-ping* —cakes with the "five poisons" molded on their tops. It is an old, old custom for friends to send them as gifts during the festival season. People say, "Oh, they are just for fun. No one expects anything from eating them." But one thing is certain, they do help to promote friendliness. Could the "five poisons" bring any better protection?

SMOOTH-BILLED ANI

(Continued from page 544)

We had no camera film to make a record, and our local reputation as bird students was not established.

I decided to find out how credibly our story would be received, putting it to a truly acid test. Wintering and writing at Royal Palm Park was none other than Dr. Frank M. Chapman. I wrote to him, and then we went to visit him. He was keenly interested in the story of the Hollywood anis. He asked us questions, particularly about the calls. Then he contributed more information. He said that the anis were gregarious to the point of using one communal nest for their young. When we left the gentle-voiced twinkling-eyed scientist we knew that he believed in our anis, and we suspected that he thought we had had beginner's luck.

Later we talked with a wintering ornithologist from Massachusetts, who had never seen any anis, but who set out to look for them. Later she reported seeing four near the highway north of Hollywood. One pair was deep in the throes of courtship. And a local garden club member, a year-round resident, said she knew of the birds, that they nested in the vicinity, and that they were the smooth-billed species.

So when ration boards, the O.D.T. and the tax collector let you go to Florida again, look for a tomato patch about two blocks east of the federal highway that passes through Hollywood. There lizards dart beneath the brown, drying leaves, and wrens sing from scrubby palmettos. And you may find some anis, the crossword puzzle bird.

SEEING OUR PLANET FROM OTHER WORLDS

(Continued from page 546)

up, in bright twilight and so close to the sun, without a telescope, although a small telescope under favorable conditions would reveal its presence, and that of its satellite as well.

At the distance of Saturn, the earth's angular distance from the sun would be reduced to about six degrees, and it would be difficult to observe, even with a telescope. At the distance of Uranus it would never get farther away from the sun than about three degrees, and at the distance of Neptune and Pluto less than two degrees. An observer on Neptune would need a most powerful telescope to find the tiny little object so close to the sun. At this distance, even the sun itself would appear to the naked eye as a very powerful arc light with no appreciable disk. One may imagine the difficulty of finding an object only 8000 miles in diameter, with its light reduced by the fact that it is in the phase of a half-moon, within only two degrees of this arc-like sun.

This proud world of ours, which to our satellite is the most important object in the heavens next to the sun, and undoubtedly far more interesting to observe, sinks to the insignificance of a tiny point of light entirely lost to view in a blaze of sunlight at the distance of Neptune. As one travels outward beyond the limits of the solar system, in the direction of stars beyond, not only our own planet but all the major planets, including finally Jupiter, the giant of the sun's family, disappear from view completely. At the distance of the nearest bright star, Alpha Centauri, an observer would have no inkling of the fact that this brilliant star in the heavens possessed a large and interesting family dependent upon it for their very existence.

Mercury will be at its greatest distance east of the sun on December 4, but is not well placed for observation at that time, being low in the southwest at sunset. Venus is now a brilliant object in the evening sky, setting more than three hours after the sun and approaching the phase of half-moon in the telescope. Mars is in the morning sky but still too close to the sun to be well observed. Jupiter will be in quadrature with the sun on December 18, rising nearly due east around midnight in Virgo. Saturn will be in opposition with the sun on December 28, in Gemini, when it will be visible all night. It is now brighter than any star with the exception of Canopus and Sirius. Its rings are nearly at their widest opening and it is a magnificent object in the telescope.

The sun will be farthest south and winter will begin, in the northern hemisphere, on December 21 at 7:15 P.M., Eastern War Time.

Compton to College

For more than twenty-five years Dr. Wilson M. Compton has served as the executive head of the National Lumber Manufacturers Association and has been active in forest matters. He has now announced his retirement to accept the presidency of the State College of Washington at Pullman, Washington.

Save Saw Waste of Spruce

Sitka spruce—the airplane lumber—that used to be wasted in sawdust can now do its share of flying as a result of experiments in veneer cutting and gluing in which the Forest Products Laboratory cooperated with spruce producers, a Forest Service report explains.

Sitka spruce of first quality is preferred for use in airplanes because of its strength and light weight. Rigid inspection rejects all but the most perfect timber, and it is difficult to obtain enough to meet war demands. Plane builders have used both sawed lumber and glued laminated members built up from thin pieces sawed from spruce timber. In either case, in cutting timber into usable sizes, saws waste precious wood in the form of sawdust.

An alternate way of producing thin stock is to rotate the log on a machine resembling a lathe, with a long and sharp knife paring off a sheet of veneer about one-seventh of an inch thick. By this method there is no sawdust waste.

Experiments just reported show that these rotary-cut veneers can be glued together under pressure with one of the new urea-resin glues, and that the product is equivalent in strength to either the solid wood or the laminated products built up from sawed pieces. Because of the weight of the glue and the slight compression of the wood in the press, the cut-veneer laminated members are slightly—about seven percent—heavier than solid wood. But the new product is as strong and serviceable as solid wood.

When spruce suitable for airplanes is scarce, the saving in sawdust waste which this method makes practical, is regarded as important by lumber specialists for the airplane industry.

AMERICA

By HENRY B. CHASE, JR.

What is this America—this home—for which men are dying today? I can think of many things that it is, and that it should not be. It is the scent of a wild rose and the musical serenade of a pine woods sparrow on a hot summer's day. It is the flute-like carol of a wood thrush just before a storm. It is the sweet scent of a magnolia tree, and the view of a wintry sun setting behind the lace-like fringes of some majestic pine. It is the great redwoods; the hot desert with flowers all its own; the sweeping grass of the prairie, lagoons of amethyst and silver in a marsh. It is the mournful call of a band-tailed pigeon; the cow bells on a distant farm. It is all of these—and many more—sounds and scents, scenes and symbols. It is these and not the sound of the tinkle of coins; the waste of barren fields and grassless meadows; the horror of burned forests and treeless deserts; the awful silence of duckless marshes and deerless forests. America is positive not negative. Let us keep it so.

These people buy a battleship —every week!

Meet John S.....and Mary D.....

John works at an electronics plant on Long Island, and makes $85 a week. Almost 16% of it goes into War Bonds.

Mary has been driving rivets into bombers at an airplane plant on the West Coast. She makes $55 a week, and puts 14% of it into War Bonds.

John and Mary are typical of more than 27 million Americans on the Payroll Savings Plan who, every single month, put half a BILLION dollars into War Bonds. That's enough to buy one of those hundred-million-dollar battleships every week, with enough money for an aircraft carrier and three or four cruisers left over.

In addition, John and Mary and the other people on the Payroll Plan have been among the biggest buyers of *extra* Bonds in every War Loan Drive.

They've financed a good share of our war effort all by themselves, and they've tucked away billions of dollars in savings that are going to come in mighty handy for both them and their country later on.

When this war is won, and we start giving credit where credit is due, remember John and Mary. After the fighting men, they deserve a place at the top. They've earned it.

You've backed the attack—now speed the Victory!

AMERICAN NATURE ASSOCIATION

This is an official U. S. Treasury advertisement—prepared under auspices of Treasury Department and War Advertising Council

Under the Microscope

By JULIAN D. CORRINGTON

HISTORICAL OUTLINE

Pasteur, Koch, and Lister—the great triumvirate of the golden age of bacteriology! Never again, it may be, will it be given to so few to do so much for mankind, to paraphrase a recent war-inspired statement. French, German and English—how engrossing the division of achievement among the three leaders in the western European family of nations.

We have recounted some of the facts dealing with the life of Louis Pasteur, culminating in his overthrow of the old belief in spontaneous generation in 1861, and have described contributions of the chief men who were his scientific forebears in developing the germ doctrine of disease. Pasteur's masterful work in proving that the "diseases" of wines and beers were caused by specific ferments led his mind along a channel that was to run from wines to caterpillars, to chickens, to sheep and, finally, to man. He saved the wine and beer industry and gained such fame that he was then sent to the south of France to investigate a malady of silkworms that at the time was threatening to destroy the entire silk industry of his country.

Searching for microorganisms where others would probably have tried, in vain, to discover a chemical cause, he found (1865-70) not one but two microbes, and the further fact that the silkworms were afflicted with two separate diseases. This direct one-to-one ratio between a pathogen (disease-producer) and a definite disease led to the idea that if specific organisms cause particular diseases in silkworms, they may do so as well in other animals, including man.

Pasteur's germ theory of disease became definitely and convincingly established by his work on anthrax in combination with discoveries he had made while engaged on the problem of eradicating fowl cholera, a piece of research begun in 1879. By chance he found that an old culture, when inoculated, conferred immunity from the deadly fowl cholera; that is, caused the elaboration in the host of immunizing bodies that would protect against further attacks. The injection either produced no symptoms of the disease, or they appeared in a milder, non-fatal form. He was the first to use the word "attenuated" in describing these old cultures, and the causal organism of fowl cholera has since been named *Pasteurella* in his honor. Although Edward Jenner had discovered (1796) and published (1798) the technique of vaccination for smallpox, he had not understood the underlying principles of his work, and so Pasteur became the scientific or effective father of the modern science of immunology.

The attack on the anthrax problem had enlisted the determined work of a number of people, as Pollender, Davaine, and Koch (this Department, April, 1944), and definite proof had been advanced that *Bacillus anthracis* produced anthrax when contracted by or inoculated into experimental animals. In spite of these demonstrations, though, there were many who still scoffed at the entire theory that highly microscopic organisms could produce so dire a disease, and it remained to Pasteur to clinch the matter once and for all by arranging what is generally considered the most spectacular scientific experiment of all time.

Following the method he had used in fowl cholera, Pasteur made attenuated cultures of anthrax bacilli for use as vaccines. In May, 1881, before a large audience, including scientists and physicians, fifty sheep were inoculated with a virulent strain of anthrax bacilli. Half of these sheep had been immunized and these survived; the other half, unprotected, died. Pasteur's crowning achievement was, of course, his solution of the most difficult medical problem of the day—a cure for rabies. Even in our times, with Pasteur Institutes, and with the Pasteur treatment available at most hospitals, any outbreak of this terrible disease, always fatal when untreated, brings forth an immediate reaction from an alarmed public, and the rabid dog, fox, hog, or other species is more highly feared than a tiger or a cobra.

Pasteur never succeeded in finding the pathogen of rabies. What he discovered was that the disease attacks the central nervous system and that pieces of the spinal cord from an animal with rabies can be dried in sterile air and can then be pulped to form an extract for immunizing a victim of mad dog bite. Again it was his principle of attenuation, to secure a weakened virus. The longer the tissue is dried, the weaker the pathogen becomes; hence a patient can receive first an injection made from ten-day-old cord, next from nine-day, then eight-day material and so on, each inoculation progressing in virulence. Cases taken in time and receiving this treatment are today seldom lost.

Pasteur had experimented successfully on animals and was convinced that the method would work equally well with man, yet he was loath to submit to the final test of treating a human victim. Suddenly an urgent necessity for such action was brought to his attention, and there followed the dramatic demonstration on the little boy, Joseph Meister, July 6-16, 1885. The first injection in the badly-bitten youth was from rabbit spinal cord, from a rabid animal, 14 days in the drying bottle and lacking in virulence. As the days passed and the injections increased in strength, Pasteur became more and more worried over the possible effects of the stronger material. On the 16th, the final administration was given, from cord only one day old and so virulent that when injected into a healthy laboratory animal, it produced rabies with certainty and speed.

It took an immense amount of courage and of conviction in one's own discoveries in those days to inject so lethal a preparation into a human subject. Critics and enemies were not lacking, and it doubtless would have gone hard with Pasteur had he failed. But all went well and the boy recovered fully, without ever developing rabies. The method was rapidly adopted and Pasteur became the most celebrated of Frenchmen. Since his era the number of immunizing vaccines and sera has become manifold. Pasteur unquestionably placed in the hands of our present physicians the most single potent weapon ever discovered in the age-old warfare on disease.

EXPLORING STATES OF MATTER

As a follow-up to the leading article in this Department for June-July of this year, on Diffusion and Osmosis, some remarks on the various states of matter that one may encounter in exploring the physical world will round out the subject more fully.

The ancient concept placed all forms of matter under one of three states, the familiar division into solid, liquid, or gas. While this classification is still valid, modern tools of investigation, including the microscope, have shown numerous differences in each of these groups, unknown until recent years. A few simple observations will serve to demonstrate some of these discoveries.

Place a small quantity of sand in a test tube half filled with water and shake thoroughly. Nothing happens save that the particles quickly separate out, and we say that the sand, a solid, is insoluble in water. The sand may be dirty, discoloring the liquid, or it may contain soluble impurities, but pure quartz sand will not be affected. We may heat or boil the water, or substitute acid or even such a splendid solvent as xylene, yet the sand remains unchanged. The inclusion of sand in water is not a solution, but a mere mechanical mixture.

We may do the same with fine clay or with a pinch of starch, both of which have a much smaller particle size than sand. A well-shaken tube of water with a bit of starch will remain cloudy for some time and can be termed a suspension; the starch does not go into solution in cold water any more than did the sand. On the other hand, if some starch is boiled in water, the grains swell and burst, resulting in a gelatinous paste that will keep its form almost indefinitely if protected from evaporation and spoilage. A substance having this property is called a colloid, and the mixture with water is a colloid suspension.

A true solution is formed when a small amount of cane sugar is shaken up in the tube of water. The sugar disappears and the water seems perfectly clear; we say that sugar dissolves in the water. Even under the microscope the sugar cannot be detected, although its presence is easily discerned by taste. The sugar may be recovered by evaporating the water; it will crystallize; but it will not pass through an animal membrane during osmosis demonstrations very readily, since the size of its molecules is very large.

Salt in water likewise forms a true solution, but with a marked difference. Salt will crystallize out when the water is evaporated, but this solution will pass through a semipermeable membrane with the greatest of ease. On entering water, the two atoms composing a molecule of salt dissociate, the sodium and the chlorine severing partnership. When this happens in a solution, an atom, or in many cases a group of atoms, is termed an ion and bears an electrical charge. Salt is said to ionize into a positively charged sodium ion and a negatively charged chlorine ion; the salt as such no longer exists. Sugar and salt are crystalloids and form crystalloidal solutions, the only true solution in physical chemistry. The salt solution is also termed an electrolyte in that it can readily be dissociated by an electric current into sodium hydroxide and hydrochloric acid.

Instead of using a solid and a liquid we may next try two liquids. Add a pipetteful of any convenient oil to half a test tube of water and shake, examining a drop of this combination under the microscope. It will be seen that the oil and water do not actually mix; the oil droplets are separated from the water by films and, as the minutes pass, the droplets will run together into drops of ever increasing size until all of the oil has separated and floats on top. These two fluids are said to be immiscible—that is, not mixable. Like the sand grains in water, this is a very transient mechanical mixure and not a solution.

To another tube of water add a pipetteful of oil, then a small quantity of liquid soap, and shake vigorously. The oil is now broken up into an enormous number of exceedingly fine droplets, the soap so lowering the surface tension of the water that the oil drops remain separate, not running together at least for a very long time. Such a suspension of one fluid within another is an emulsion. Under the microscope the water is the invisible background in which the droplets float and is said to be in the continuous phase, while the oil is in the dispersed phase. The whole is a disperse system and the oil is the dispersoid. The same experiment can be reversed by adding a pipetteful of water to a test tube half filled with oil, plus a small amount of an alkaline-earth soap, as calcium soap. When shaken, the same result occurs, but this time the oil is in the continuous phase and the water in the dispersed phase. This emulsion is again a disperse system, but the water is now the dispersoid.

These terms apply as well to mixtures or solutions of solids in liquids. Very fine clay particles shaken up in water form a suspension, the clay being the suspensoid. This sort of mixture is termed a coarse dispersion; boiled starch in water makes a colloidal dispersion, and salt in water a molecular dispersion. Living protoplasm constitutes a colloidal disperse system, as seen in a living amœba.

A molecular disperse system is formed when two completely miscible fluids are united. Alcohol and water, for example, will mingle in all proportions as a true solution. Ionization occurs when hydrochloric acid is added to water. The acid, an electrolyte, dissociates into positively charged hydrogen ions and negatively charged chlorine ions. Some writers also distinguish a chemical solution from a physical one. In the former, a chemical change accompanies solution, as when metallic silver is passed into nitric acid. These ingredients react first to form silver nitrate, which then is dissolved by the acid; the solution is one of silver nitrate, not of silver. The salt or hydrochloric acid solutions, by contrast, are not accompanied by any such chemical reaction and are termed physical or mechanical solutions.

We have paid no attention to gases thus far in this account, but they, too, may form mixtures, suspensions, and solutions. Cigarette smoke blown into the atmosphere of a room produces a suspension of solid carbon particles in air; water vapor in air is a mixture or solution of gases, as is air itself. When the vapor condenses into fine droplets, as in fog and clouds, we have a suspension of a liquid in a gas. This, too, is a disperse system, the water being the dispersoid. The reverse condition is established when air is dissolved in water, the air being then the dispersoid. This happens in any form of aëration of water, as when a river plunges over a fall or when air is bubbled up through the water of an aquarium, and on the presence of such

TECHNICAL BOOKS for GIFT PURPOSES

The microscope is the hand-maiden to all the sciences and those who follow its adventuresome trail must have many a guide to direct them along the right path.

One item that is wholly indispensable is books! Any of the following, depending on the individual's inclinations, will make an acceptable and valued Christmas gift.

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air, with its contained oxygen, the very life of all aquatic animals depends. A fish will die in stale water.

Thus, while all matter may exist in any of the three states—solid, liquid, or gas—much of the interest attaching to studies on the states of matter is found in analyzing the behavior of different forms of matter when mixed. Atoms and molecules, elements and compounds, alloys, mixtures, suspensions, emulsions, solutions; the whole story is by no means unraveled and new discoveries await the explorer in that border land claimed by both the chemist and the physicist.

CHRISTMAS SUGGESTIONS

This year is an exceptionally favorable one in which to make the transition from a miniature to a standard microscope. General information to the contrary notwithstanding, new as well as reconditioned laboratory-sized instruments are available from dealers and manufacturers, and the wherewithal to buy them is more plentiful. If you have an ardent microscopist in your family who has survived the introductory period with only a miniature microscope and who is still eager to accomplish more, this is the time to graduate to something adult and permanent. If you are such a microscopist yourself, put down a standard instrument as your chief desire.

Many of the accessories are not as easy to obtain now as formerly, but there is one form of remembrance that is always most acceptable—books. A gift volume on the microscope itself, on the technique of making slides, on photomicrography, or on one of the numerous groups of objects for microscopic study, as textiles, insects, algae, parasites, is a sure fire bet in the lower price range. For your convenience we are carrying this month a complete listing of all of the books previously advertised in former issues. Any of these books may be ordered through our Microbook Department—but do not wait until the last minute! Shipments are slow these days.

BOOK REVIEWS

Ernest S. Booth's *Laboratory Anatomy of the Cat* is an excellent one, representative of the school of teaching that prefers to place in the hands of the student a minimum of printed directions and a maximum of fully-labeled drawings, essentially an anatomical atlas. The drawings, by Carl Petterson, are accurate and well done: we discovered some mistakes in the labeling as well as spelling errors in the text, not unusual in first editions, but these did not mar for us the general high quality of the volume. The work deals with straight descriptive anatomy; there are no references to physiological, histological, embryological, or morphological relationships, and no drawings either to be made or labeled by the student; his sole job is simply to learn his cat anatomy. Personally we would not like to teach the subject in this manner, but that is aside from the point that for those who do this book is commendable for its comprehensive yet concise treatment and for its convenient format. Pp. 58, figs. 56. College Place, Wash., 1943, $1.50. Order from Prof. Ernest S. Booth, Dept. of Biology, Walla Walla College, College Place, Wash.

Plant pathology is a subject of ever-increasing importance in our modern life. Heretofore the material on this science has been largely confined to technical papers or advanced texts for students. In *Diseases and Pests of Ornamental Plants*, however, we now have a work written expressly for Mr. and Mrs. John Q. Public; a manual for the home-owner and for the gardener, whether professional or amateur. The authors are Drs. Dodge and Rickett, of the New York Botanical Garden, the book representing the culmination of the life work and experience of the senior author, organized and written largely by the junior author.

Part 1 considers diseases and pests in general, and, while dispensing as much as possible with scientific terms and technicalities, develops a sufficient vocabulary, as it was felt that to emasculate the work entirely would be to insult the reader's intelligence. Diseases are classified and discussed, followed by accounts of bacteria, fungi, insects, and other pests; then methods of control, in which the reasons back of standard procedures are stressed so that the user of this manual could adapt principles to new or unusual problems. Part 2 is a detailed survey of the diseases and pests of particular hosts, of which there are some 600 arranged alphabetically by their botanical names. For each, chief enemies are described and preferred methods of control specified. This useful book will be a standard reference on the subject for years to come: it is thorough, authoritative, and up to date. Part 2 badly needs dictionary-style page headings—so much so we wonder at this oversight by both authors and publisher. The novel system of numbering illustrations is likewise confusing, a difficulty that could be cleared up by a few words of explanation at the very beginning. Pp. xii, 638; 119 illustrations. Jacques Cattell Press, Lancaster, Pa. $6.50.

Material available on general as contrasted with plant or human physiology has been scanty, and so the appearance of a new and genuinely basic text, *An Outline of General Physiology*, by Professor L. V. Heilbrunn, University of Pennsylvania, in 1937, was decidedly welcome. Now a second edition is out, completely rewritten and brought up to date. The 42 chapters in this fairly large volume consider in turn the chemical reactions of protoplasm and the living machine, the interchange of energy, and the effects of the environment; roughly speaking, the chemical, physical, and biological properties of living matter.

The author has performed a most valuable service for the science of physiology by digesting and bringing together the immense amount of literature on all forms of life. Scarcely a page is without its copious footnote citations, so that aside from its high merits as a text, the work is invaluable as a reference. In a special note to student readers, Dr. Heilbrunn explains use of the book for both purposes in a manner other authors would do well to emulate. The writing of a volume with such tremendous coverage and frequency of detailed and documented treatment poses a severe strain on style, yet Professor Heilbrunn manages to combine distinctive authorship with charm and interest, a difficult and noteworthy achievement in itself. Pp. xii, 748; figs. 135. W. B. Saunders Co., West Washington Square, Philadelphia 5, 1943. $6.00.

Among newer additions to the Harvard Books on Astronomy is *Galaxies*, by Harlow Shapley. Like its predecessors, it is a beautifully illustrated and handsomely printed smallish volume, written by an internationally known authority. Originating from an observatory where more galaxies have been photographed and studied than in all other astronomical institutions, this book is based on extensive original research. It describes the present state of knowledge of the largest unit of matter within the known cosmos, that prodigious aggregation of billions of stars, formerly termed an island universe, now called a galaxy. It discusses kinds of galaxies, their numbers and distances, the tools and methods used in their study; the employment of the Cepheid variables and the Magellanic Clouds to yield galactic information; our own galaxy, the Milky Way System; and that total assemblage of all galaxies referred to as the Metagalaxy.

The amount of information one derives from reading this book is considerable. Technicalities and mathematical methods are held to a minimum, and the author emphasizes repeatedly what is not known and the direction that future investigations should take, and distinguishes clearly between proven facts and hypotheses. For the average layman, we believe the book would be improved by omission of the frequent references in the earlier half to later chapters:—there is too much "as we shall see later——" which is merely confusing. The book should also stand on its own feet more than at present and not take it for granted that the average reader has consulted earlier works in this series. Definitions are far too scanty and assume, for example, that one has read *Atoms, Stars, and Nebulae*, by Goldberg and Aller, previously reviewed in these columns. Pp. vii, 229; figs. 126. The Blackiston Co., 1012 Walnut St., Phila. $2.50.

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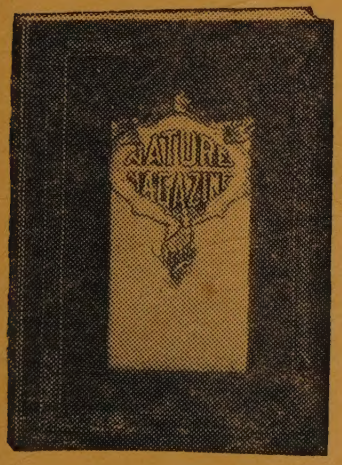

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Prosperity. Stocks up fifty points in a week. Again everybody was buying everything—yachts, jewelry, stocks, real estate, regardless of cost. Depression? Phooey... we thought we'd found a way to lick depression.

Or had we? Bread lines, apple venders. WPA. "Brother, can you spare a dime?" No jobs. Prices dropping. Wages dropping. Everything dropping—except the mortgage on the house. "What goes up must come down."

We're splurging again. Americans have been earning more money. But even today there are fewer goods to spend it on—so naturally prices rise. We must keep them in check. DON'T LET *IT* ALL HAPPEN AGAIN!

---

4 THINGS TO DO to keep prices down and help avoid another depression

1. Buy only what you really need.
2. When you buy, pay no more than the ceiling prices. Pay your ration points in full.
3. Keep your *own* prices down. Don't take advantage of war conditions to ask for more—for your labor, your services, or the goods you sell.
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